# ANNOUNCEMENT
# OF COURSES

GRADUATE AND
UNDERGRADUATE

STATE UNIVERSITY
OF NEW YORK
COLLEGE OF FORESTRY

Vol. 6

1967-69
TO
1971-72

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# COLLEGE
# OF
# FORESTRY
# 1967-1969
# CATALOG

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## STATE UNIVERSITY OF NEW YORK

# STATE UNIVERSITY OF NEW YORK

The State University of New York, established by the State Legislature in 1948, comprises 67 colleges and centers. At present, 57 conduct classes: four University Centers, two Medical Centers, ten Colleges of Arts and Science, seven Specialized Colleges, six two-year Agricultural and Technical Colleges and 28 locally-sponsored, two-year Community Colleges.

Three additional Colleges of Arts and Science are in varying stages of development. Two four-year campuses, in Nassau and Westchester Counties are now in early planning. The third campus as proposed in an amendment to the University's 1964 Master Plan, would be upper-divisional (junior-senior years) in concept and located in the Utica-Rome-Herkimer Area. Master's level programs will be offered at all three campuses.

The Trustees also have approved the establishment of seven additional community colleges. In varying stages of development, they are sponsored by Clinton, Columbia-Greene, Cortland-Tompkins, Essex-Franklin, Genesee, Herkimer and Ontario Counties.

State University further comprises the Ranger School, a division of the College of Forestry which offers a 43-week technical forestry program at Wanakena, and the Center for International Studies and World Affairs located at Oyster Bay.

The University offers four-year programs in many fields, including agriculture, business administration, ceramics, dentistry, engineering, forestry, home economics, industrial and labor relations, law, liberal arts and sciences, maritime service, medicine, nursing, pharmacy, professional museum work, public administration, social work, teacher education and veterinary medicine.

Its two-year programs include nursing and liberal arts transfer programs and a wide variety of technical courses in such areas as agriculture, business, and the industrial and medical technologies.

Graduate study at the doctoral level is offered by the University at 12 of its campuses, and graduate work at the master's level at 24 campuses. The University is continuing to broaden and expand over-all opportunities for advanced degree study.

Governed by a Board of Trustees appointed by the Governor, State University of New York comprises all State-supported institutions of higher education, with the exception of the four-year colleges of City University of New York. Each college and center of State University is locally administered. Although separated geographically, all are united in the purpose to improve and extend opportunities for youth to continue their education beyond high school.

The State University motto is: "Let Each Become All He Is Capable of Being."

## ACCREDITATION

STATE UNIVERSITY OF NEW YORK is accredited by the Middle States Association ot Colleges and Secondary Schools. The College of Forestry is also accredited by the Society of American Foresters. The School of Landscape Architecture is accredited by the national professional organization, The American Society of Landscape Architects.

# STATE UNIVERSITY
# COLLEGE OF FORESTRY
# AT SYRACUSE UNIVERSITY

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## GENERAL CATALOG
## 1967-1969

# STATE UNIVERSITY OF NEW YORK

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# ACADEMIC CALENDAR

## *First Semester, 1967-68*

| | |
|---|---|
| Dormitories Open | September 10 (8 a.m.) |
| Registration | September 12-15 |
| Classes Begin | September 16 (8 a.m.) |
| Middle of Term | November 11 |
| Thanksgiving Weekend | November 22 (12 m.) -27 (8 a.m.) |
| Christmas Recess | December 20 (12 m.) -January 3 (8 a.m.) |
| Last Day of Classes | January 13 |
| Final Examinations | January 15-26 |
| Interim Recess | January 26-31 |

## *Second Semester, 1967-68*

| | |
|---|---|
| Registration | February 1-3 |
| Classes Begin | February 5 |
| Middle of Term | March 23 |
| Spring Recess | March 23 (12 m.) - April 1 (8 a.m.) |
| Last Day of Classes | May 18 |
| Final Examinations | May 20-29 |
| Commencement | June 1 |

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# I

# THE COLLEGE GOALS

One-third of the land area of the United States is forested, and in many other countries, especially those just now developing industrial societies, the percentage is much higher. Efficient use of forests, and related natural resources, requires an ever-growing number of scientists and managers. The development, manufacture, and use of forest products and materials continue to accelerate in today's expanding technology. Creating a functional, pleasing, livable environment for man becomes increasingly important as population pressures build. It is a College goal to educate students in a wide spectrum of disciplines to fill professional positions in these fields, and to instill in these graduates a knowledge of human affairs.

Research, the seeking of new facts, is a corollary of education, and is another College goal. Research is a vital scholarly activity of the faculty, and helps provide a strong teaching base for undergraduate as well as graduate students.

Public service, the third major goal, has a history as old as the College itself. Using the same broad concept of forestry as is found in the classrooms, public education efforts range from the individual to mass audiences.

To accomplish these goals the College seeks capable, dedicated students who desire to acquire knowledge and to use this knowledge to assume responsible and creative positions in society.

It seeks to improve the environment for learning and research by providing modern, well-equipped classrooms, laboratories, and library facilities. It continually seeks to enhance the already distinguished faculty and supporting staff. It seeks to improve curriculums to meet today's changing science, engineering and social requirements.

The College strives to find more effective ways to reach the public, in order to be of greater service to individuals, industries, and all levels of government. And it strives to continue its role of leadership in natural resources higher education.

HUGH R BAKER
LABORATORY

# II

# THE COLLEGE ESTABLISHMENT

The College of Forestry was founded as a State College in 1911, and became a unit of the State University of New York when it was created by the Legislature in 1948. The central administrative offices of State University are in Albany. The Dean is the chief executive officer of the College, and is governed by policies established by the College of Forestry Trustees and the State University Trustees. Because of the cooperative relationship with Syracuse University, a close liaison is maintained with the Chancellor and other administrative officers.

## ENVIRONMENT

The campus of the College adjoins that of Syracuse University on one of the hills which surround and overlook metropolitan Syracuse. The city, near the geographical center of New York, is the core of an urban and industrial region of nearly 450,000 population. Numerous manufacturing firms apply modern technology in electrical, chemical, mechanical, metallurgical, and biological fields. Major highways, and rail, air, and bus lines, intersect at Syracuse.

Both the City of Syracuse and Syracuse University offer varied cutural and recreational opportunities, including exhibitions of paintings and sculpture, recitals and concerts, amateur and professional theater, dance and cinema, lectures in the humanities, forums and addresses by political and social scientists. The annual Arts Festival is among the special attractions of the campus.

Among the city's cultural assets are the Syracuse Symphony Orchestra and the Everson Museum of Arts of Syracuse and Onondaga County, both with a fine philosophy of community service and participation.

Recreation opportunities are varied because of the central New York climate and geography. General facilities for winter and summer sports are enjoyed by residents and students. The City of Syracuse and Onondaga County have extensive park systems, and State Parks are nearby. The Finger Lakes Region begins 18 miles away, and the Thousand Islands are 90 miles from Syracuse. The Adirondack and Catskill Mountain Parks and Niagara Falls are within 150 miles.

## CAMPUS

Bray Hall, Louis Marshall Memorial Building, Hugh P. Baker Memorial Wood Products Laboratory, Biological Sciences Laboratory, and the Moon Memorial Library are the principal buildings. The latter two are nearing completion, and a new Paper and Wood Fiber Laboratory is under construction.

Off campus facilities include nearly 22,000 acres of forest land at six locations used for instruction, demonstration, and research. A tree nursery and small arboretum are included in the total. At the Archer and Anna Huntington Wildlife Forest Station in the Central Adirondack Mountains, a Forest Wildlife Research Laboratory is in final planning stages. A complete sawmill operation is carried out at the Pack Demonstration Forest, near Warrensburg.

On the campus are the following institutes and centers: Cellulose Research Institute, Empire State Paper Research Institute, Polymer Research Institute, State University Water Research Center, and the World Forestry Institute. A work center of the U. S. Forest Service and the Roosevelt Wildlife Experiment Station are also at the College.

The College is extensively furnished with modern equipment and instruments for instruction and research in its major subject areas with considerable emphasis on wood and wood products. These include an electron microscope, a 1,000-curie cobalt-60 radiation source, a radioisotopes laboratory, a computer center, and specialized instrumentation including nuclear magnetic resonance, electron spin resonance, ultracentrifuge, x-ray, and infra-red spectrophotometer. The pulp and paper laboratory has a semi-commercial paper mill with accessory equipment. The greenhouse and forest insectary are used to produce plant and insect material for classroom and laboratory. Extensive collections are available for study, including wood samples from all over the world, botanical materials, insects, birds, mammals, and fishes.

*Left:* Bray Hall.
*Right:* Baker Laboratory, Marshall Hall, Library and Biological Sciences Buildings, and Paper and Wood Fiber Laboratory.

FOREST BIOLOGY LABORATORY - LIBRARY [illegible]
NEW YORK STATE COLLEGE OF FORESTRY

## STUDENTS AND FACULTY

Education in the classroom, laboratory, and field is a cooperative endeavor between students and faculty, and is an enriching experience for both. This two-way communication is traditional at the College, so much so that Deans and Department Chairmen, with considerable administrative responsibilities, still meet classes and consider it a privilege to do so.

Men and women are accepted as students at the College, and at present number 1,071. Of these, 865 are undergraduates and 206 are graduate students.

The College provides instruction for professional work in seven, four-year curriculums, some of which contain optional programs. Each leads to the Bachelor of Science degree, or in the case of one, to the Bachelor of Landscape Architecture degree. Most undergraduates enter at the Freshman level, but the number of transfer students entering at the Sophomore and Junior levels is increasing.

Graduate study, leading to the Master's degree and Doctor of Philosophy degree, began when the College was founded. The first advanced degree was awarded in 1913. Since then graduate enrollment has increased steadily and averages 20 per cent of the registration. Graduate students choose among many fields of forestry, forest products, and their supporting science disciplines for their work toward a degree. Each year the College awards a number of scholarships, fellowships, and assistantships to degree candidates. (See page 80 for Graduate Study.)

The teaching staff of the College is comprised of 105 professors, associate professors, assistant professors, and instructors. Professional research associates number 8. Selected professors are designated as graduate faculty, but they also teach undergraduate courses and are available for undergraduate consultations. Many of them serve as advisors to undergraduates which is particularly helpful to students seeking advanced degrees.

## TECHNICAL EDUCATION

The College has been training men for technical forestry work since 1912 at the Ranger School at Wanakena, N. Y. It is situated on 2,680 acres on Cranberry Lake in the Adirondack Mountains. The school offers a terminal one-year course which prepares men for a variety of technical forestry jobs. Additional information can be obtained from the Director, New York State Ranger School, Wanakena, New York.

## PUBLIC EDUCATION

The College serves the public directly through its Department of Forest Extension with public service a responsibility of all faculty members.

The Department issues technical and semi-technical bulletins on the results of research and applications in various fields of forestry, and popular publications of information and advice. These publications are described in a list sent free on request.

Short courses are annually offered business and industry men seeking knowledge and techniques useful in their work. A number of conferences and meetings are also held at the College each year.

The vast amount of new technical information available to wood-using manufacturers has brought about the need for an abstracting and referral service which the College offers. Also, a team of wood utilization specialists is available to industrial companies with special problems.

A tree pest information service is maintained by the College.

Mass communications techniques are used to reach the public with certain types of information, including radio and television, motion pictures, exhibits, lectures, newspapers and magazines, and trade journals.

Requests for service in public education and information should be addressed to the Department of Forest Extension at the College.

## LIBRARY

The Franklin F. Moon Memorial Library contains more than 83,000 catalogued books and pamphlets, and receives more than 640 current journals and society publications. Besides containing one of the three largest collections in the U. S. in the field of forestry, the Library is now developing strong holdings in the disciplines of pulp and paper technology, the basic biological sciences, polymers, and landscape architecture. Through the Robin Hood Collection the Library offers a carefully selected and broad choice of non-professional reading of general interest.

The Library subscribes to the usual abstracting and indexing services to be found in most scientific libraries as well as to services peculiar to the specialization of the College.

Interlibrary loan privileges with institutions throughout the U. S. and Canada are extended to qualified researchers. Accessible to faculty and students are the diversified resources of the libraries of Syracuse University, the State University Upstate Medical Center, the Syracuse Public Library, and the special scientific libraries of industrial companies located in the Syracuse area.

## III

# YOU AND THE COLLEGE

How can you best prepare for a professional career and a lifetime that will last well into the 21st century? This is the question facing you, a high school graduate, as you consider a college education. While the future is full of uncertainty and challenge, you can be sure that the role of the scientist, the engineer, the manager, and the landscape architect will expand during the years ahead.

Forestry as generally understood means the wise, continuous use of forests and their products for human benefit. Managing forest resources for optimum yields of timber and wood products, plentiful supplies of water, and abundance of wildlife, natural beauty, attractive recreational environments, and other services and products is a major responsibility of foresters.

Forest products industries, including wood processing, wood products manufacturing and retailing, pulp and paper, and the cellulosic products, rank high in the nation's economy. All require many wood products engineers, wood merchandisers, and pulp and paper technologists to design and direct their operations, to merchandise their products, and to conduct developmental and basic research. Broad opportunities in the synthetic fiber, film, lacquer, plastics, dissolving pulp and other cellulosic and polymer industries are available for chemists with training in wood and polymer chemistry.

Biological sciences serve a vital function to both forestry and forest products, and special curriculums have been developed at the College that recognize these relationships.

Landscape architecture is a profession that attempts to develop natural land areas for both aesthetic and functional purposes. In recent years it has assumed great importance in the fields of land use planning and recreation.

The demand for men and women specializing in forestry and associated resources, forest products and materials, and landscape architecture, far exceeds the supply. Since you are considering the College of Forestry, we can assume that you have already decided on a science oriented education. But it may be helpful to you if we explain the major fields of specialization available at the College.

## FOREST BIOLOGY

This curriculum offers a basic education in biology and presents and integrates modern concepts in the molecular, cellular, organismal, and environmental areas of biology. It places emphasis on forest organisms and includes an orientation to forestry principles. The curriculum is divided into two options. The biological sciences option primarily prepares students planning graduate study in botany, forest pathology, entomology, silviculture, wildlife management, or zoology. A variety of research careers with state, federal, and private organizations and instructional positions are available for biologists specializing in these areas. The forest wildlife management option is designed for students interested in wildlife management and emphasis is placed on animal ecology and forestry practice. The option prepares students primarily for state, federal, and private positions in wildlife biology and the management aspects of wildlife resources.

## FOREST CHEMISTRY

Recent developments of the science of polymer chemistry has had a profound impact on the study of forest products, for it has increased the knowledge of the chemical nature of wood, which is a mixture of natural polymers. Many funda-

mental problems related to life processes are also being investigated by chemists who have adequate training in the life sciences and especially in the physiology of animals, plants, insects and micro-organisms. The chemistry department, therefore, has a Wood and Polymer Chemistry option and a Biochemistry option. By selection of proper electives, students may be certified on graduation as having completed an American Chemical Society approved curriculum. Both options permit specializations in areas that are not generally available within the usual liberal arts program.

## FOREST ENGINEERING

The forest engineering curriculum is designed to serve those students interested in both forestry and engineering who look forward to challenging careers in the engineering and development aspects of forest resource management. Effective resource management is more and more dependent upon forest engineering for such projects as site construction and other physical development, transportation system planning, road and bridge construction, new buildings and service facilities, hydrologic structures, equipment engineering, modern electronic measurements and communications, data control and analysis, and systems and operations engineering. Combining civil or industrial engineering principles with essential forestry course work, this curriculum consists of a four-year degree program at the College with a fifth year in engineering at Syracuse University where an engineering degree is awarded. Graduate programs can also follow the four-year forest engineering curriculum.

## LANDSCAPE ARCHITECTURE

The profession of landscape architecture is expanding to meet new demands for functional and attractive outdoor environments in town and city as well as an increased demand for recreational areas in rural and forest lands. Site planning is a current part of industrial, commercial and public building location. Highway and parkway planning has a new requirement of beauty as well as efficiency. An association with forestry is valuable for a thorough understanding of modern man's appreciation and need for naturalistic landscape forms in his city and rural landscapes. Students receive a basic understanding of woody plant materials, their insect pests and diseases, and other aspects of land resource use. The curriculum offered by the School of Landscape Architecture emphasizes graphics, design, construction, plant materials, land administration, and planning.

## PULP AND PAPER TECHNOLOGY

The pulp and paper industry is one of the major industries in our nation, and is expanding all over the world. This complex industry will require an increasing supply of highly skilled and specialized personnel, including control chemists, research chemists, production engineers, and technical service representatives. An education in pulp and paper technology is related to the physical sciences, mathematics, and chemical engineering with special emphasis on their applications to the fundamental principles of pulping and papermaking. These studies involve chemistry, physics, the chemistry of pulping and bleaching, engineering principles of pulping, paper formation, drying, and finishing and the application of these sciences and principles to processing and production.

## RESOURCES MANAGEMENT

This curriculum prepares men for professional positions as forest land managers. It provides a broad general education in the biologic, economic, sociologic, and managerial principles basic to forestry with its technology and field practices. Major emphasis is on timber, with attention to related water, wildlife, and recreational values. Two concepts that receive priority are multiple-use of forest lands and high timber productivity. Resources management is recommended for students interested in timber management, forest protection, watershed management, and the management of forest recreation lands. It is flexible enough to allow courses in several areas, including resources planning, administration, applied biology, world forestry, and conservation, and provides sound preparation for graduate study in forestry.

## WOOD PRODUCTS ENGINEERING

Technology of the wood products industries has become highly complex, providing broad opportunities for professional employment to graduates with training in this field. Knowledge of the structure and properties of the many commercial woods, their processing, manufacture into finished products, and new product development, as well as their distribution to the consumer, is a part of the training of a wood products engineer. Basic sciences and engineering principles are a requisite in the wood manufacturing industries, as well as the wood treatment industries.

The management of wood products industries and the sales of wood products require the basic principles of business administration, in addition to extensive technical knowledge. Graduates of wood products engineering are in demand for industrial and sales employment in the product fields, such as veneer and plywood, furniture, adhesives, finishes, wood processing equipment, construction lumber, and allied industries. Challenging careers are available in research, education, and similar technical services, both public and private. Opportunities for self-employment are numerous.

# IV

# UNDERGRADUATE STUDY

## HOW TO PREPARE FOR THE COLLEGE OF FORESTRY

Your admission to the College will be based on your academic qualifications after careful analysis of data provided by your high school or other scholastic records, standardized tests, and school recommendations. In many cases an interview will be held to assess interests and scholastic abilities.

Minimum requirements are at least 16 units as follows: English, four units; history (social studies), two units; science (at least one unit in chemistry or physics), two units; mathematics (through trigonometry), three units; and electives, five or more units. A foreign language and mechanical drawing are recommended electives.

New York Regents grades of at least 70 per cent are required for admission. Applicants who do not offer Regents credit may take the Scholastic Aptitude Test of the College Entrance Examination Board, and/or subject area achievement tests.

## COLLEGE LIFE

Your Freshman year will likely set the pattern of your undergraduate education. You will probably determine your standard of scholarship and the degree of participation in extracurricular activities for your college career. You will decide upon objectives and activities important to you. The management of your time for study, work or play, and the responsibility for your every action will rest with you. This is the period when you will make new friends and find your place in a new environment.

### *Orientation*

To help ease the adjustment to college life, all Freshmen attend an orientation period during registration week of the fall semester. Here you will meet your classmates, and members of the faculty and administration. You will become acquainted with the College. Orientation continues throughout the semester with a weekly one-hour meeting. During the early, formative period in your college career you will learn what is expected of you and where to get help when you need it.

### Work Load

Classes, laboratories, and study will occupy by far the greatest portion of your time at the College. Even though you anticipate working harder than ever before at college, you will find that it requires more time than you expected. The average Freshman spends about 24 hours a week in class, and at least a like amount of time in out-of-class study. The usual credit hour load is 17.

Even so, you will have reasonable opportunity to participate in extracurricular activities. In these activities you find social and recreational outlets and develop qualities of leadership, strengthen cultural and religious interests, and broaden your experience with people and organizations.

### Extracurricular Activities

STUDENT GOVERNMENT: As a member of the student body, you will participate in the election of class officers and the Student Council. The Council is the official representative body governing extracurricular student affairs. It supervises and finances a number of student activities.

PUBLICATION: The KNOTHOLE is a news sheet published weekly during the school year. It contains both news and opinion and is produced entirely by its student staff. The EMPIRE FORESTER is the College yearbook, and has a long tradition of excellence. It is published by a student staff with a faculty advisor.

PROFESSIONAL AND DEPARTMENTAL ORGANIZATIONS: There are several opportunities for you to join clubs that will advance your knowledge and broaden your acquaintance with students of similar interests. Following is a list of these organizations: Botany Club, Chemistry Club, Entomology Club, Mollet Club (landscape architecture), Papyrus Club (pulp and paper), Wood Engineers Club, and the Forest Zoology Society.

OTHER ORGANIZATIONS: Vox Silvae is an organization to improve the public speaking ability of students through debate. Robin Hood is the all-College honorary society. Alpha Xi Sigma is the senior honorary society. Saengerbund is the College glee club.

### *Syracuse University*

As stated previously, the College of Forestry is located adjacent to Syracuse University and a close relationship between the two institutions has been maintained through the years. Students may participate in Student Government, organizations, and other extracurricular activities at Syracuse University.

COURSES: Some of the required course work in general education and basic physical sciences at the College is taken at Syracuse University. Forestry students may also take electives related to their programs of study upon receiving their advisor's approval. Courses taken at Syracuse University are covered by the tuition and fees of the College of Forestry.

LIVING ON CAMPUS: Residence in a Syracuse University living center or an approved sorority house (upperclasses only) is required of all undergraduate women, although permission may be secured from the Dean of Women to live with blood relatives if the parents are willing to transfer all responsibility for the student to the relative concerned.

All freshmen men are required to live in University dormitories, and the University accepts the responsibility for the housing (dormitories or fraternities) of all undergraduate men.

Syracuse University housing units are available for married students. Veterans are given preference, but there are ordinarily apartments for non-veterans.

ATHLETICS: Payment of the general student fee entitles undergraduates to free admission to University home athletic events upon presentation of the official identification card, and the same applies to graduate students enrolled for six or more credit hours.

Athletic facilities for men include Archbold Gymnasium, which houses basketball courts, handball and squash courts, a rifle range, rowing tank, and championship-size swimming pool. A ski tow and lodge on University property at Skytop are centers of much interest and recreation during the winter. There are 22 tennis courts at the University. The new Manley Field House provides indoor practice facilities for many sports, including football, baseball, track, and lacrosse, and is the site of home basketball games.

Sports and dance activities for women offer the opportunity to acquire skill and understanding of these activities through the Department of Physical Education for Women.

## COLLEGE SERVICES

### *Academic and Personal Counseling*

The Office of Student Services is available throughout your College career as a place where you may seek at any time the advice of experienced counselors. The Dean of Students should be your first contact when questions or personal problems arise that are difficult to solve. He will assist you in finding solutions to your special academic, personal, and financial problems. The Registrar in the Student Services Office is available as needed to provide information and guidance on general academic and specific program requirements. In addition the Student Financial Aids officer of the Student Services Office provides information on available scholarships, long-term state and federal educational loans, work opportunities at the College and major financial problems.

Traditionally, the College faculty has placed emphasis on academic advisement both formally and informally to meet individual student needs and considers this close faculty-student association to be a major academic strength. During registration you will be assigned a faculty advisor to assist you as needed in your curriculum decision, program development and elective decisions. When you select a curriculum special advisors will be assigned to provide academic advice as needed. Faculty in your major department are available also for academic guidance. In addition, many classes are small permitting students ample opportunity to discuss their courses and professional aspirations with instructors. While advice and counsel are available on an individual basis as needed, students at the College are encouraged early in their careers to become independent and responsible for their academic decisions as will be required in later professional life.

### *Other Counseling*

Full-time ministries are provided in all the major religious groups. They center their programs at Hendricks Chapel, except for Roman Catholics, who are served at Saint Thomas More Chapel. The Dean of Hendricks Chapel coordinates religious activities, working with eight full-time and six part-time denominational chaplains and advisors. The program of Saint Thomas More Chapel is under the direction of a chaplain.

Extracurricular activities are under the guidance of a faculty committee, the members of which meet with students during planning sessions and offer their counsel when necessary.

Resident counselors are located in all dormitories, and are available for help and assistance if needed.

As students reach the end of their undergraduate years, they often seek career guidance. Highly motivated students should consider the question of whether or not to continue their education in graduate school. At the College, this sort of counseling is handled by the departments or divisions in which you take your major work. At the completion of your college career, placement counseling is available.

### *Health and Medical Facilities*

Students may consult a physician for medical care or health advice at the Syracuse University Student Health Service, and are entitled to unlimited visits to the out-patient clinic and also 10 days of confinement with ordinary medical care in the Infirmary per college year. Infirmary usage over 10 days will be at prevailing Infirmary rates. The usual laboratory examinations if necessary for treatment or diagnosis of common illness are in the main provided without cost. Most common drugs are provided without extra charge.

A student accident or sickness insurance plan is available, and not only supplements the usual Infirmary privileges, but is also a health protection during the summer months when students are not under care of the Health Service. Married students with dependents who are not covered by Health Service privileges are strongly urged to provide themselves and their families with special insurance made available to University students. Graduate student insurance requirements are explained in Chapter VI.

### *Military Service*

The Registrar's Office keeps on file up-to-date information on Selective Service. A request for draft deferment as a college student, of course, must be made by you and certified by the Registrar. Students reaching 18 years of age after arriving in Syracuse, may register with Selective Service in the Office of Student Services.

A Reserve Officer Training Corps program is available, however a minimum of two years is required. Continuation of R.O.T.C. during the Junior and Senior years must be approved by the College and the Military Department.

### *Hearing and Speech Center*

The Gordon D. Hoople Hearing and Speech Center provides remedial assistance to all regularly enrolled students who may be handicapped by hearing, speech, and voice disorders. This service is without expense to students.

### *Psychological Research Center*

Students desiring an analysis of their aptitudes, abilities, and interests may secure special testing programs at the Research Center.

### *Reading Laboratory*

The School of Education, in cooperation with the College of Liberal Arts and the Psychological Research Center, maintains a reading laboratory for research in the learning skills and for training teachers and specialists in reading. Representatives from the fields of medicine, speech, and psychology cooperate in making diagnoses and in planning remediation. Large numbers of University students use this facility to improve their reading skills.

## UNDERGRADUATE COLLEGE REGULATIONS

The complete rules and regulations of the College of Forestry are available in a separate publication, which may be obtained from the Office of Student Services. It is distributed to all students at registration, but it is the student's responsibility to secure a copy. The following information does not endeavor to prescribe in detail what is either permitted or denied, but rather is confined to some of the basic academic regulations and procedures of interest to entering students.

### *Course Selection*

Courses are to be chosen in accordance with the regulations of an established degree program, and it is the student's responsibility to plan his program so that all degree requirements are met.

### *Course Load*

Normally a student will register for a course load of 16 to 18 hours.

### *Late Registration*

A student who fails to report for registration or fails to complete registration during the authorized period, is subject to a penalty unless excused by the Dean or his representative.

### *Assignment of Grades*

In each course final grades are given at the end of the semester and are expressed in letters as follows: A — excellent, B — good, C — average, D — minimum passing, F — failure, INC — incomplete, and in courses 201 and 225, S — satisfactory, U — unsatisfactory. An incomplete must be made up within one year (time not registered as a student does not count) or an F is recorded.

### *Grade-Point Average*

For the purpose of determining grade-point averages, letter grades have the following values: A, 4 points for each semester hour; B, 3 points for each semester hour; C, 2 points for each semester hour; D, 1 point for each semester hour; and F, no points. Both semester and cumulative scholastic averages are computed by dividing the total grade points accumulated by the total credit hours carried.

Only courses carried at the College of Forestry or Syracuse University, including Utica College and University College, are used to compute grade-point averages.

Formerly, the College was on a three-point grading system, but beginning in September, 1967, the above four-point system will apply.

### Academic Standards

A student whose cumulative or semester average falls below 2.00 (C) will have his record reviewed by the Academic Standards Committee. If the record indicates that he might be able to meet the requirements later, he will be placed on probation. If, however, in the judgment of the Committee, he will not be able to meet the requirements, he will be dropped. In general, a freshman will be dropped at the end of the first semester if his average is below 1.50.

### Graduation Requirements

A student will be recommended for graduation only if he has completed the required courses prescribed for his major, and has a minimum average of 2.00. In general, this requires four years' work, either at this College or in some other College of approved standing. Residence at this College during the final year is obligatory. In some degree programs there are requirements which must be completed during one of the summer periods.

### Academic Honors

Students achieving a 3.0 (B) average or above for the semester are placed on the Dean's Honor List and a commendation is sent by the Dean to both students and parents.

Graduation Honors: A student is recommended for the Bachelor of Science degree *summa cum laude* if his average for the four years is 3.83 or better; for the B.S. degree *magna cum laude* if his average is 3.34 to 3.82; and for the B.S. degree *cum laude* if his average is 3.0 to 3.33.

## COST OF ATTENDING THE COLLEGE

The tuition and fee structure includes library, health, infirmary, physical education, R.O.T.C., special testing and other services, as well as an assessment for student activities and charges for expendable supplies and equipment. A non-refundable fee of $5 must accompany the application for admission, but is not required of transfers from other units of State University of New York. (Graduate students refer to Chapter VI).

### *Residents of New York State*

Total tuition and fees of $435.00 to be paid as follows:

| | |
|---|---|
| Advance Payment* | $100.00 |
| Due at September registration | 167.50 |
| Due at February registration | 167.50 |
| Total | $435.00 |

### *Non-residents of New York State*

Total tuition and fees of $635.00 to be paid as follows:

| | |
|---|---|
| Advance Payment* | $100.00 |
| Due at September registration | 267.50 |
| Due at February registration | 267.50 |
| Total | $635.00 |

*Advance Payment of $100 is due within thirty days from the date of acceptance. It is refundable up to May 1.

### *Other Costs*

Assessment for the Student Loan Fund and Alumni Association membership of $1 is required of sophomores each semester. A commencement fee of $10 is required at the beginning of the semester in which the degree is expected.

Housing costs at Syracuse University range from $280 to $500 for 34 weeks depending upon the size of the room. Most rooms are for two students and are furnished with beds, mattresses, pillows, desks, chairs, study lamps, and dressers. A commercial linen service operates on campus and is available for those who order it.

Board costs at Syracuse University are $550 for 34 weeks, 20 meals weekly (none Sunday night). Housing and board rates are subject to change and inquiries about them should be sent to: Dean of Men, or Dean of Women, Syracuse University, Syracuse, New York 13210.

Other expenses, including books and supplies, average about $85 for the fall semester and $65 for the spring semester. Certain curriculums require a summer session in field forestry following the sophomore year, which lasts for 10 weeks and costs approximately $245. Extended field trips, lasting up to three weeks, are required in landscape architecture, pulp and paper technology, and wood products engineering, and these range in cost from $60 to $150.

### *Terms of Payment*

Either check or money order should be made out to "S.U.N.Y. College of Forestry," and payment is made at the Business Office of the College. The advance payment should be mailed to the Business Office, College of Forestry, Syracuse, New York 13210. Payment for housing and board is made to Syracuse University.

## FINANCIAL AID

It is easier today than ever before to finance a college education. Various types of scholarships, government aid, and loans are available at the College of Forestry for students who need financial assistance. Scholarships and loans are often obtained from sources in the students' home communities, such as companies, fraternal organizations, service clubs, churches, alumni groups and the like.

Complete information on financial assistance may be obtained from the Student Financial Aids officer at the College, either directly or by mail. Some of the various types of aid, however, are listed below:

For New York State residents, the Scholar Incentive Program, Regents Scholarships, and State University Scholarships all offer possible financial aid. The New York Higher Education Assistance Corporation offers loans to residents which are interest free until after college, and then draw 3 per cent annual interest. Repayment may be made during a six-year period after college.

Any student in good standing and who needs financial assistance may borrow up to $500 a semester under the Student Loan Program of the National Defense Education Act of 1958. No interest will accrue until one year after college, and part of the loan will be cancelled if the student becomes a public elementary or secondary school teacher or college teacher. A 10-year repayment period is allowed.

The College of Forestry Alumni Association offers a variety of assistance. Memorial Awards are made to outstanding students, interest-free loans are available to meet emergency expenses, and several educational grants ranging from $200 to $500 each are made each year.

Tuition waivers may be granted to qualified foreign students.

Special financial assistance include the following: Charles Lathrop Pack Awards, Charles Malcomb Harlow Memorial Loan Fund, Friedrich U. Klaehn Memorial Scholarship in Silviculture, David B. Schorer Memorial Fund, Edward Vail Emergency Fund, C. Ives Gehring Memorial Fund, James D. Judson Memorial Fund, Bargeron Memorial Scholarship, and the Portia Farrell Morgan Scholarship.

Other opportunities include: Allied Paper Salesmen's Association Award, Harold L. Austin Memorial Scholarship, Black-Clawson Scholarship, Boxboard Research and Development Scholarship, Nelson Courtlandt Brown Scholarship Fund, Henry H. Buckley Student Aid Awards, Geigy Dyestuff's Scholarship, C. E. Libby Award, Mead Corporation Award, Milton Conservation Club Award, Frank B. Myers Memorial Award, New York-Canadian Division of Paper Industry Management Association Scholarship, Pen-Jer-Del Division of the Paper Industry Management Association Scholarship, Plastics Engineer's Award, St. Regis Paper Company Scholarship, and Syracuse Pulp and Paper Foundation Grants.

In addition, work scholarships are available to pre-freshmen, there are part-time work opportunities at the College, and the Economic Opportunity Act of 1964 offers a work-study program.

## HOW TO APPLY FOR ADMISSION

To apply for admission, you should request the proper forms and instructions from the College's Office of Admissions. Allow about three weeks for delivery of this material. Revised forms are available beginning in September of one year for entry the following year.

Early acceptance for September admission will be given when warranted by the record supporting an application, and notices of early acceptance are mailed beginning December 15. The target date for final decision on most applications for September entry is April 1. A copy of the message of decision on an application is sent to the applicant's high school. (Graduate students refer to Chapter VI).

### *Transfer Students*

Students with previous college experience, or who are currently enrolled at another college may apply for transfer upon successful completion of at least one year. Transfer applications are considered for February as well as September. However, February transfer will depend upon the availability of courses appropriate to the curriculum selected.

It is the policy of the Admissions Committee that any student who is academically dismissed must wait at least one year before applying to this college.

The course work which is presented for credit must be equivalent to our required courses, or comparable to elective offerings at Syracuse University. All courses acceptable for transfer credit must carry a grade of "C" or better.

The following concentration of courses and credit hours are, for the most part, equivalent to the first two years at Forestry in any of our curriculum offerings with the exception of Landscape Architecture:

| | *Credit Hours* | | *Credit Hours* |
|---|---|---|---|
| English | 6 | Humanities | 6 |
| *Gen. Chemistry (Inorganic) | 8 | General Physics | 8 |
| Social Science | 6 | Elective & Speech | 6 |
| Math. (Alg.-Trig.) | 6 | Calculus | 6 |
| Botany & Zoology | 8 | Electives | 6 |

*Qualitative Analysis should be covered.

Electives: Graphics (Mech. Drawing) — Report Writing — Economics — Geology.

Generally, satisfactory completion of the above courses will permit you to transfer to Forestry as a junior. In contrast, Landscape Architecture will require three (3) years to complete degree requirements. In addition to the courses outlined, eight (8) hours of Organic Chemistry will be required before the junior year in Forest Chemistry, Pulp & Paper, Wood Products Engineering-Science, and the Biological Sciences.

In applying to the College for transfer, it is your responsibility to submit a recent official transcript from the college you are currently attending, and similar documents from all colleges previously attended. Also, a catalog from each college must be submitted early in the application process for use in evaluation of credit.

### *Admission Examination*

State University of New York requires an applicant for admission to take its standardized State University Admissions Examination if the applicant is residing or attending school in the State during the year prior to entrance to college. The College Director of Admissions may waive the requirement for, (1) applicants from outside New York State, who must substitute scores earned in the Scholastic Aptitude Test of the College Entrance Examination Board, (2) late applicants, and (3) applicants for admission as transfers from another college.

Information about the times and places that the examination is held is provided in the kit of application materials. The Regents Scholarship Examination, given in high schools of New York during the first part of October, serves as a State University Admissions Examination. Scores that an applicant earns on either examination are provided to the College as confidential information from State University of New York.

### Health Examination Report

Each new student is required to submit a history and physical examination report on a form that will be sent after the initial acceptance notice. It is to be completed and returned within two weeks to the Student Health Service, 804 University Avenue, Syracuse, New York 13210.

Transfer students must, in addition, provide the Health Service with a transcript of their health records from the college previously attended.

### Entrance With Advanced Standing

Secondary school students may earn credit toward the B.S. or B.L.A. degree before enrolling as freshmen at the College. This enables students to carry lighter course loads, and may be accomplished in two ways:

1. Evening and Saturday courses in mathematics or English, for instance, given by a nearby college may be open to recommended high school seniors. After successful completion, an official transcript or other appropriate document should be sent to the College by the institution along with a catalog description of the course or courses.

2. College-level courses given by high schools in the Advanced Placement Program of the College Entrance Examination Board to recognize and develop academic talent. Such courses as biology, mathematics, chemistry, English, and foreign languages offer opportunity for degree credit at this College. The determination of credit is made by faculty members to whom the student's final examination papers are sent after they have been graded.

### College Proficiency Examinations

The College Proficiency Examination Program is a means by which students may receive college credit for specific courses by examinations, without being in residence for a course or taking structured correspondence lessons. These examinations are open to all who make application.

The College approves of the CPE program in general and will evaluate the performance of participants. Satisfactory performance by a student must be demonstrated during at least one semester in residence at this College before granting credit. This residence may be prior or subsequent to the examination.

If all College policy requirements are met, grades A and B will receive credit; credit for a grade of C will be granted only upon recommendation of the department of the applicant's major; and no credit will be granted for a grade lower than C.

Application for credit should be made to the Office of Student Services. Application for deviation from the prescribed policy may be made to the Academic Standards Committee for undergraduate credit and the Committee on Graduate Studies for graduate credit.

# V

# UNDERGRADUATE PROGRAMS

Of the seven four-year curriculums described in Chapter III, six lead to Bachelor of Science degrees, and one to the Bachelor of Landscape Architecture degree.

Entering Freshmen will review the demands and opportunities of the curriculums with an assigned advisor during the registration period, in order to select the first-semester elective. Before the end of the first semester, however, each Freshman must make his curriculum choice. In reaching this decision he will be assisted as needed by faculty advisors, the Dean of Students, by conversation with upperclassmen, and by firsthand acquaintance with the College's programs, facilities, and personnel.

## FRESHMAN YEAR – FIRST SEMESTER – ALL CURRICULUMS

| | | *Credit Hours* |
|---|---|---|
| F. Botany 1 | Forest Botany | 4 |
| English | Freshman English | 3 |
| Mathematics | | 3 |
| *Chemistry 6a | General Chemistry | 4 |
| Elective | | 3 |
| Orientation | | 0 |
| Phy. Educ. or ROTC | | 0 |
| | | 17 |

## TRANSFER STUDENTS

The College has made considerable effort in recent years to accommodate transfer students at the Sophomore and Junior levels. Students who have completed the two-year Engineering Science Curriculum in units of State University of New York, are particularly suited to transfer into four of the College's curriculums. These programs are shown on page

Students from other colleges should refer to the following curriculum descriptions to determine transfer opportunities. If there is some doubt about your qualifications for transfer, the Admissions Office will evaluate your record if the admissions procedure, described on page 31, is followed.

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*Students who definitely know they are going to pursue the Landscape Architecture Curriculum may take Physics 1a (with consent of their advisor) instead of Chemistry 6a.

## BIOLOGICAL SCIENCES OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 1 | Forest Botany | 4 | Chem 6b | General Chemistry | 4 |
| Chem 6a | General Chemistry | 4 | Engl 1 or 2 | Freshman English | 3 |
| Engl 1 or 2 | Freshman English | 3 | *Math | | 3 |
| *Math | | 3 | F Zool 1 | General Zoology | 4 |
| Orientation | | 0 | Elective (or option requirements) | | 3 |
| Elective (or option requirements) | | 3 | Phys Ed/ROTC | | 0 |
| Phys Ed/ROTC | | 0 | | | 17 |
| | | 17 | | | |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 2a | Dendrology | 2 | F Bot 2b | Dendrology | 1 |
| Graphics 1 | Technical Drawing | 1 | F Econ 2 | Intro to Macro Econ | 3 |
| F Mgt 1 | Surveying | 3 | Geol 1 | Introductory Geology | 3 |
| Phys 1a | General Physics | 4 | Phys 1b | General Physics | 4 |
| **Organic Chemistry | | 4 | **Electives (or option requirements) | | 6 |
| Electives (or option requirements) | | 2 | | | 17 |
| | | 16 | | | |

SUMMER SESSION IN FIELD FORESTRY—10 weeks—10 credit hours. Required of all students following the Sophomore year and transfers prior to registration for the Junior year.

| | | |
|---|---|---|
| F Biol 1 | Field Biology | 1 |
| F Mgt 3 | Forest Surveying | 2 |
| F Mgt 5 | Field Tech in Forest Mens. | 2 |
| Silvi 1 | Silviculture | 1 |
| Silvi 2 | Applied Silviculture | 2 |
| Res Mgt 1 | Forest Resources Mgt | 2 |
| | | 10 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Biol 100 | Prin of Gen Physiology | 3 | F Bot 3 | Classification of the Plant Kingdom | 3 |
| F Biol 110 | General Ecology | 3 | Electives (or option requirements) | | 12 |
| F Ento 1 | Elements of Entomology | 3 | | | 15 |
| Electives (or option requirements) | | 6 | | | |
| | | 15 | | | |

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 105 | Fund of Genetics | 4 | A M 199 | Statistical Analysis | 3 |
| ***Silvi 102 & 103 | Soils & Soils Lab | 3 | ***Silvi 101 | Prin of Silvi or elective | 3 |
| Electives (or option requirement) | | 9 | Electives (or option requirement) | | 9 |
| | | 16 | | | 15 |

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*Two semesters of calculus are required of students in the physiological areas of the Biological Sciences and recommended for others.

**In the physiological areas 8 hours of organic chemistry are required. In all other areas only 4 hours of organic chemistry are required but 4 additional hours may be elected.

***Either Silvi 101 or Silvi 102 & 103 are required.

## FOREST BIOLOGY

The curriculum is designed to educate basic biologists, and to provide an orientation to forestry principles and practices. This program was developed for those students planning graduate study in the biological fields related to forestry or seeking positions as forest biologists in forestry, forestry research, recreation, or conservation. The effective management and protection of forests and related natural resources are becoming increasingly dependent on the research contributions and professional guidance of biologists for solutions of problems centering around growth, nutrition, ecology, disease and insect pest controls, and wildlife biology.

The curriculum is built around a core of required courses which provide a sound background in biology and the physical sciences, an introduction to forestry principles, and a broad general education. The curriculum has been designed also to facilitate transfer of students from State University Community Colleges at the end of their Freshman or Sophomore years who take suggested course sequences. The curriculum is divided into two options: Biological Sciences and Forest Wildlife Management, both requiring additional courses and electives. The Biological Sciences option is primarily for students planning graduate study in biology and the Forest Wildlife Management for students interested in careers in wildlife biology and management.

### *Biological Sciences Option*

This option is flexible and individual programs may be developed within or across the subjects of botany, entomology, pathology, and zoology to meet the academic purposes and particular interests of the student. The arrangement of the courses in the core may be modified also to meet special student needs with the consent of his advisor. Requirements for federal and state forestry positions and Society of American Foresters membership requirements may be met by substituting electives for specified forestry subjects.

Option requirements in addition to courses specified for the program on the following pages are as follows:

| | |
|---|---|
| Course credits in a selected Major field (Botany, Forest Pathology, Forest Entomology, or Zoology — the courses selected must include physiology and a structure, ecology, or taxonomy course) | 12 |
| Course credits in a selected minor field (one of the course areas listed under the Major fields) | 6 |
| Electives | 22-26 |

## ELECTIVES

Students planning graduate study are urged to take two semesters of an approved language. Students interested in meeting the education requirements for federal positions in forestry at the GS-5 and GS-7 level may do so by electing 14 credits in additional forestry courses. Federal education requirements are at least 24 semester hours of course work in forestry diversified sufficiently to fall into at least four of the following specialized fields: (1) silviculture, i.e., such subjects as forest soils, forest ecology, dendrology, silvics, and silviculture; (2) forest management, i.e., such subjects as mensuration, forest regulation, and forest management; (3) forest protection, i.e., such subjects as fire protection, forest pathology, and forest entomology; (4) forest economics, i.e., such subjects as forest finance, forest valuation and forest economics; (5) forest utilization, i.e., such subjects as logging, milling, forest products, and preparation and use of wood; and (6) related studies, i.e., such subjects as forest engineering, forest recreation, range management, watershed management, and wildlife management. To assure proper diversification of course-work, not more than six semester hours credit will be given for courses in any one of the specializations listed above.

## GENERAL EDUCATION ELECTIVES — Required in the Biological Sciences Option

1. Three elective courses (totalling 9 credits) must be selected from categories A and B with at least one course from each.
    - A. Humanities
        - 1. Philosophy 2. Fine Arts 3. English
        - 4. Classical Languages 5. Modern Languages
    - B. Social Sciences
        - 1. Economics 2. Geography 3. History 4. Political Science
        - 5. Sociology 6. Citizenship 7. Psychology
2. Additional electives should be chosen from the above two categories or from natural and physical sciences not directly related to the course of study pursued by the student.
3. All elective choices are to be made with the assistance and approval of the faculty advisor.
4. Students from other colleges planning to transfer into this program are advised to schedule a general education elective in place of dendrology in the Sophomore year.

## FOREST WILDLIFE MANAGEMENT OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 1 | Forest Botany | 4 | Chem 6b | General Chemistry | 4 |
| Chem 6a | General Chemistry | 4 | Engl 1 or 2 | Freshman English | 3 |
| Engl 1 or 2 | Freshman English | 3 | F Zool 1 | General Zoology | 4 |
| Math | | 3 | Math | | 3 |
| Orientation | | 0 | *Elective (or option requirements) | | 3 |
| *Elective (or option requirement) | | 3 | Phys Ed/ROTC | | 0 |
| Phys Ed/ROTC | | 0 | | | |
| | | 17 | | | 17 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 2a | Dendrology | 2 | F Bot 2b | Dendrology | 1 |
| Graphics 1 | Technical Drawing | 1 | F Econ 2 | Introduction to Macro Econ | 3 |
| F Mgt 1 | Surveying | 3 | Geol 1 | Introductory Geology | 3 |
| Phys 1a | General Physics | 4 | Phys 1b | General Physics | 4 |
| *Electives (or option requirements) | | 6 | *Electives (or option requirements) | | 6 |
| | | 16 | | | 17 |

SUMMER SESSION IN FIELD FORESTRY—10 weeks — 10 credit hours. Required of all students following the Sophomore year and prior to registration for the Junior year (including Junior year transfer students who elect this program).

| | | |
|---|---|---|
| F Biol 1 | Field Biology | 1 |
| F Mgt 3 | Forest Surveying | 2 |
| F Mgt 5 | Field Tech in Forest Mens | 2 |
| Silvi 1 | Silviculture | 1 |
| Silvi 2 | Applied Silviculture | 2 |
| Res Mgt 1 | Forest Resources Mgt | 2 |
| | | 10 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Biol 100 | Prin of Gen Physiology | 3 | F Bot 3 | Classification of the Plant Kingdom | 3 |
| F Biol 110 | General Ecology | 3 | F Zool 100 | Prin of Wildlife Mgt | 3 |
| F Ento 1 | Prin of Entomology | 3 | *Electives | | 9 |
| F Zool 105 | Vertebrate Anatomy | 4 | | | |
| *Elective | | 2 | | | |
| | | 15 | | | 15 |

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 105 | Fund of Genetics | 4 | A M 100<br>A M 199 | Elem Probability and Statistics or<br>Statistical Analysis | 3 |
| F Zool 200 | Prac of Wildlife Mgt | 3 | *Electives | | 12 |
| Silvi 104 | Prac of Silviculture | 3 | | | |
| *Electives | | 6 | | | |
| | | 16 | | | 15 |

*Four credit hours of Organic Chemistry are required of students in this option. Four additional hours may be elected.

Students are urged to take a second semester of general economics. Students must take additional courses in the following subject areas to meet educational requirements for federal positions in forestry: 2-3 credits in protection; 3 credits in forest management; 3 credits in forest utilization; and 3 credits in an additional protection or utilization course or forestry economics. These courses are to be scheduled in the elective time available.

### ***Forest Wildlife Management Option***

Students electing this option will meet both the Society of American Foresters and Civil Service educational requirements as a forester. This opens to them employment opportunities in a variety of wildlife management and forestry fields. Students with graduate interests in Wildlife Management are encouraged to take the Biological Sciences option.

GENERAL EDUCATION ELECTIVES – Required in the Forest Wildlife Management Option

1. Three elective courses (totalling 9 credits) must be selected from categories A and B with at least one course from each.
    A. Humanities
        1. Philosophy  2. Fine Arts  3. English
        4. Classical Languages  5. Modern Languages
    B. Social Sciences
        1. Economics  2. Geography  3. History  4. Political Science
        5. Sociology  6. Citizenship  7. Psychology
2. Additional electives should be chosen from the above two categories or from natural and physical sciences not directly related to the course of study pursued by the student.
3. All elective choices are to be made with the assistance and approval of the faculty advisor.
4. Students from other colleges planning to transfer into this program are advised to schedule a general education elective in place of dendrology in the Sophomore year.

## BIOCHEMISTRY OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 1 | Forest Botany | 4 | Chem 6b | General Chemistry | 4 |
| Chem 6a | General Chemistry | 4 | Engl 1 or 2 | Freshman English | 3 |
| Engl 1 or 2 | Freshman English | 3 | *Math | | 3 |
| *Math | | 3 | F Zool 1 | General Zoology | 4 |
| Orientation | | 0 | Elective | | 3 |
| Elective | | 3 | Phys Ed/ROTC | | 0 |
| Phys Ed/ROTC | | 0 | | | 17 |
| | | 17 | | | |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 20a | Organic Chemistry | 3 | F Chem 20b | Organic Chemistry | 3 |
| F Chem 21a | Organic Chemistry Lab | 1 | F Chem 21b | Organic Chemistry Lab | 1 |
| F Econ 1 | Intro to Econ for Foresters | 3 | Engl 10b | Technical Writing | 2 |
| Engl 10a | Adv Comp & Lit | 2 | *Math/Elective | | 4/3 |
| Graphics 1 | Technical Drawing | 1 | Phys 12 | Gen Physics for Sci Stu | 4 |
| *Math/Elective | | 3/4 | Elective | | 3 |
| Phys 11 | Gen Physics for Sci Stu | 4 | | | 17/16 |
| | | 17/18 | | | |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 2a | Dendrology | 2 | Chem 134 | Instrumental Methods | 2 |
| Chem 132 | Quantitative Anal | 2 | Chem 135 | Instrumental Methods Lab | 1 |
| Chem 133 | Quantitative Anal Lab | 1 | Chem 140b | Physical Chemistry | 3 |
| Chem 140a | Physical Chemistry | 3 | Chem 141b | Physical Chem Lab | 1 |
| Chem 141a | Physical Chem Lab | 1 | Elective | | 3 |
| Elective | | 3 | **Biol Elective | | 3 |
| **Biol Elective | | 3 | Mathematics Elective | | 3 |
| | | 15 | | | 16 |

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 105 | Fund of Genetics | 4 | F Chem 109b | Intro to Research | 6 |
| F Chem 109 | Intro to Research | 1 | F Chem 114 | Undergraduate Seminar | 1 |
| F Chem 125a | Chem of Cell & Wood | 3 | F Chem 130b | Biochemistry | 3 |
| F Chem 126 | Cell & Wood Chem Lab | 2 | Pub Add 51 | Public Speaking | 3 |
| F Chem 130a | Biochemistry | 3 | Elective | | 3 |
| F Chem 131 | Biochemistry Lab | 2 | | | 16 |
| Elective | | 3 | | | |
| | | 18 | | | |

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*Mathematics through Math 105b (a 3 credit hour course) or equivalent is required.

**Three hours have to be in Physiology; for the other, a course in structural and/or developmental biology is recommended.

## FOREST CHEMISTRY

By selecting proper electives, students in either of the two following options may be certified on graduation as having completed an American Chemical Society approved curriculum.

### *Biochemistry Option*

This program provides training in the basic physical sciences with supplementary instruction in the biological areas. The option includes inorganic, organic, physical, and analytical chemistry courses as well as biochemistry, mathematics, and physics. The required biological courses are botany, dendrology, zoology, plant physiology, and genetics.

## WOOD & POLYMER CHEMISTRY OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 1 | Forest Botany | 4 | Chem 6b | General Chemistry | 4 |
| Chem 6a | General Chemistry | 4 | Engl 1 or 2 | Freshman English | 3 |
| Engl 1 or 2 | Freshman English | 3 | *Math | | 3 |
| *Math | | 3 | F Zool 1 | General Zoology | 4 |
| Orientation | | 0 | Elective | | 3 |
| Elective | | 3 | Phys Ed/ROTC | | 0 |
| Phys Ed/ROTC | | 0 | | | |
| | | 17 | | | 17 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 20a | Organic Chemistry | 3 | F Chem 20b | Organic Chemistry | 3 |
| F Chem 21a | Organic Chemistry Lab | 1 | F Chem 21b | Organic Chemistry Lab | 1 |
| F Econ 1 | Intro to Econ for Foresters | 3 | Engl 10b | Technical Writing | 2 |
| Engl 10a | Adv Comp & Lit | 2 | *Math/Elective | | 4/3 |
| Graphics 1 | Technical Drawing | 1 | Phys 12 | Gen Physics for Sci Stu | 4 |
| *Math/Elective | | 3/4 | Elective | | 3 |
| Phys 11 | Gen Physics for Sci Stu | 4 | | | |
| | | 17/18 | | | 17/16 |

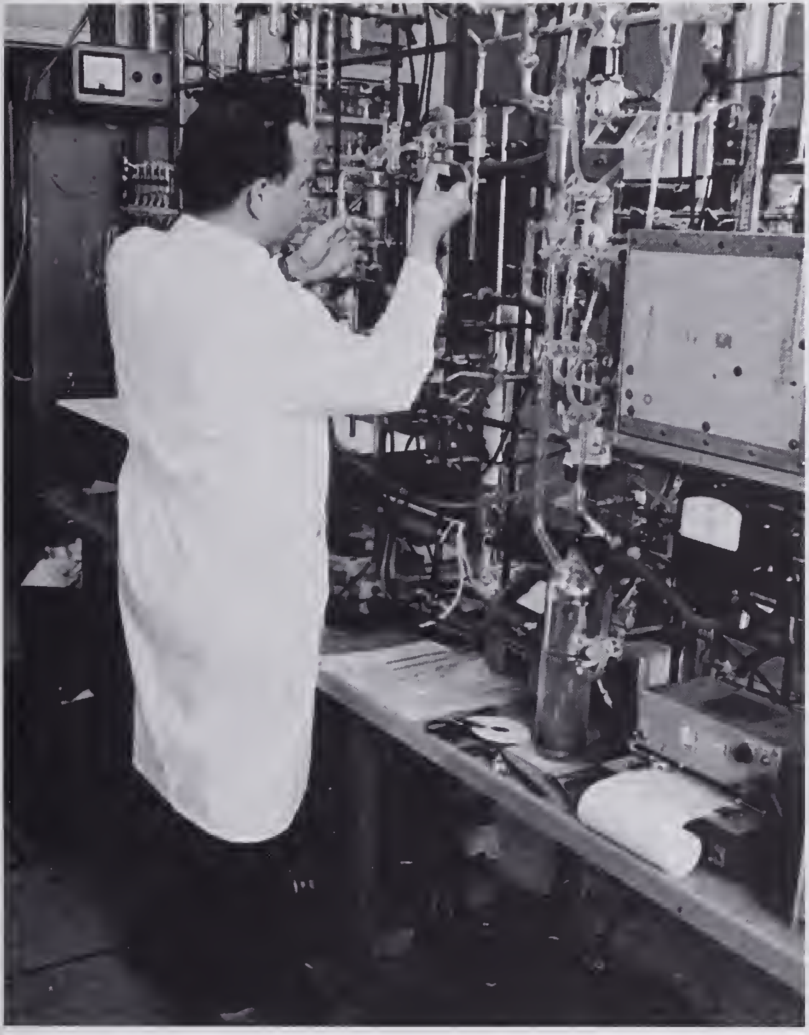
### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 2a | Dendrology | 2 | Chem 134 | Instrumental Methods | 2 |
| Chem 132 | Quantitative Analysis | 2 | Chem 135 | Instrumental Methods Lab | 1 |
| Chem 133 | Quantitative Anal Lab | 1 | Chem 140b | Physical Chemistry | 3 |
| Chem 140a | Physical Chemistry | 3 | Chem 141b | Physical Chem Lab | 1 |
| Chem 141a | Physical Chem Lab | 1 | Pub Add 51 | Public Speaking | 3 |
| Elective | | 3 | WPE 8 | Elem Wood Tech | 4 |
| Mathematics Elective | | 3 | Elective | | 3 |
| | | 15 | | | 17 |

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 109a | Intro to Research | 1 | F Chem 109b | Intro to Research | 6 |
| F Chem 121 | Intro to Polymer Chem | 3 | F Chem 114 | Undergraduate Seminar | 1 |
| F Chem 124 | Polymer Technique Lab | 2 | F Chem 122 | Polymer Prop & Process | 3 |
| F Chem 125a | Chem of Cellulose & Wood | 3 | F Chem 125b | Chem of Cellulose & Wood | 3 |
| F Chem 126 | Cell & Wood Chem Lab | 2 | Elective | | 3 |
| Elective | | 3 | | | |
| Choice of: | | 3/4 | | | 16 |
| F Chem 130a | Biochemistry (3) | | | | |
| or | | | | | |
| P&P 1a | Pulp & Paper Proc (3) | | | | |
| or | | | | | |
| WPE 100 | Phys & Mech Prop of Wood (4) | | | | |
| | | 17/18 | | | |

*Mathematics through Math 105b (a 3 credit hour course) or equivalent is required.



### Wood and Polymer Chemistry Option

This option supplements the classical chemistry curriculum with its thorough grounding in the basic sciences by incorporating studies of the chemistry of synthetic polymers, cellulose, and other natural polymers, and the structure, anatomy, and physics of wood. A substantial number of industries are seeking employees with this training and superior students are well qualified for continuing into graduate school.

# FOREST ENGINEERING

## Freshman Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Bot 1 | Forest Botany | 4 |
| Chem 6a | General Chemistry | 4 |
| Engl 1 or 2 | Freshman English | 3 |
| *Math | | 3 |
| Orientation | | 0 |
| Elective (Philosophy preferred) | | 3 |
| Phys Ed/ROTC | | 0 |
| | | 17 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| Chem 6b | General Chemistry | 4 |
| Engl 1 or 2 | Freshman English | 3 |
| *Math | | 3 |
| F Zool 1 | General Zoology | 4 |
| Elective (Philosophy preferred) | | 3 |
| Phys Ed/ROTC | | 0 |
| | | 17 |

## Sophomore Year

| | | |
|---|---|---|
| F Bot 2a | Dendrology | 2 |
| Graphics 1 | Technical Drawing | 1 |
| Phys 1a | General Physics | 4 |
| *Math/Elective | | 3 |
| Elective (Logic) | | 3 |
| Elective | | 3 |
| | | 16 |

| | | |
|---|---|---|
| F Bot 2b | Dendrology | 1 |
| F Econ 2 | Intro to Macro-Econ | 3 |
| Geol 1 | Introductory Geology | 3 |
| Phys 1b | General Physics | 4 |
| *Math/Elective | | 3 |
| Elective | | 3 |
| | | 17 |

## Junior Year

| | | |
|---|---|---|
| A M 110 | Statistical Theory | 3 |
| F Econ 3 | Intro to Micro-Econ | 3 |
| M E 29 | Statics | 4 |
| Silvi 111 | Meteorology and Fire Behavior | 3 |
| A M 150 | Intro to Computer Program | 3 |
| | | 16 |

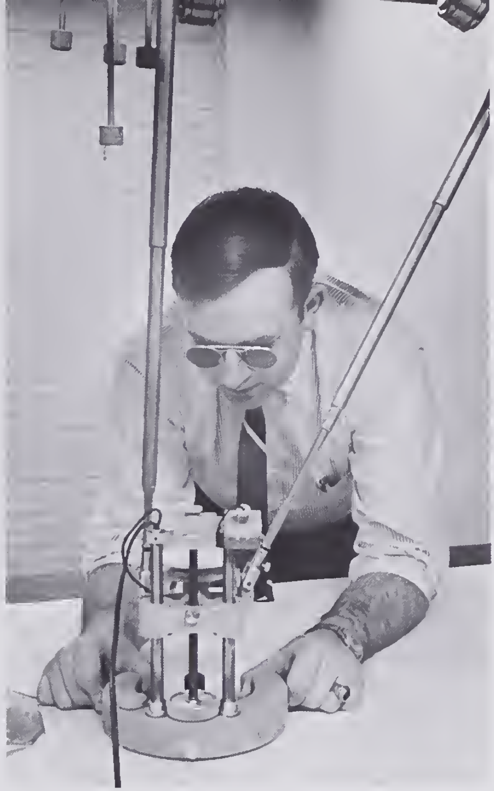
| | | |
|---|---|---|
| F Engr 101 | Surveying | 3 |
| F Engr 106 | Hydrology | 3 |
| F Engr 103 | Photogrammetry | 3 |
| C E 120 | Mechanisms of Deformable Bodies | 3 |
| Silvi 101 | Prin of Silvi | 3 |
| Electives | | 3 |
| | | 18 |

## Senior Year

| | | |
|---|---|---|
| F M 112 | Policy and Admin | 3 |
| F Engr 105 | Structures | 3 |
| F Econ 101 | Prin of Econ | 3 |
| C E 180 | Soil Mechanics | 3 |
| F Engr 111 | Production Prin | 3 |
| Elective | | 3 |
| Math 181 | Higher Math for Engrs<br>or | |
| C E 210 | Analytical Photogrammetry I | |
| | | 18 |

| | | |
|---|---|---|
| M E 31 | Dynamics | 3 |
| F M 106 | Mgt Planning and Operations | 3 |
| F Engr 102 | Mensuration | 3 |
| Elective (legal concepts) | | 3 |
| Elective | | 3 |
| C E 162 | Structures<br>or | |
| I E 162 | Analytical Methods in I E<br>or | |
| C E 211 | Analytical Photogrammetry II | |
| | | 15 |

*Mathematics through 105c or equivalent is required.



## FOREST ENGINEERING

The primary objectives of this curriculum are: (1) to provide a creditable discipline combining portions of civil, industrial, and mechanical engineering with corresponding essentials of forestry preparation for resource management, and (2) to qualify men for professional acceptance both as foresters and as engineers in those career opportunities where close collaboration in both of these professional fields is required.

The curriculum consists of a four-year program at the College of Forestry preparatory to a fifth year in engineering at Syracuse University. The B.S. degree will be awarded by the College upon completion of the four-year program; a B.S. degree in engineering will be awarded also by Syracuse University upon completion of requirements in a fifth year. Graduate programs at the College, building upon the four-year forest engineering curriculum, are also possible during the fifth year.

Minimum professional requirements both in forestry and engineering are met by the core of required courses, and these would be strengthened in areas suited to the student's goals through proper advisory use of the 24 to 27 hours of electives that may be taken throughout the program.

# LANDSCAPE ARCHITECTURE

## Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 1 | Forest Botany | 4 | Engl 1 or 2 | Freshman English | 3 |
| Chem 6a or Phys 1a | Gen Chem or Phys | 4 | E I 1 | Prin of Land Use | 3 |
| Engl 1 or 2 | Freshman English | 3 | Geol 1 | Introductory Geology | 3 |
| Phys Ed/ROTC | | 0 | Graphics 2 | Technical Drawing | 2 |
| Math 2 | | 3 | Pub Add 51 | Public Speaking | 3 |
| Orientation | | 0 | Electives | | 2/3 |
| Elective | | 3 | Phys Ed/ROTC | | 0 |
| | | 17 | | | 16/17 |

## Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 2a | Dendrology | 2 | F Bot | Elective | 3 |
| Engl 10a | Adv Comp & Lit | 2 | Engl 10b | Technical Writing | 2 |
| Graphics 3 | Graphics | 2 | Graphics 4 | Graphics | 2 |
| L A 1a | Basic Design | 3 | L A 1b | Basic Design | 3 |
| F Mgt 1 | Plane Surveying | 3 | L A 2 | L A Construction | 3 |
| Elective | | 3 | Elective | | 3 |
| | | 15 | | | 16 |

L A 3 (3 credit hours) Plant Materials (3 weeks). This course usually begins the last week of May, and is conducted at Farmingdale, New York.

## Junior Year

| | | | | | |
|---|---|---|---|---|---|
| E I 20 | History of Arts | 3 | E I 21 | History of Arts | 3 |
| Graphics 14 | Pencil Technique | 1 | Graphics 15 | Water Color | 1 |
| L A 22 | Landscape Design | 6 | L A 23 | Landscape Design | 6 |
| L A 30 | Plant Materials | 2 | L A 31 | Plant Materials | 2 |
| L A 40 | Land Arch Construction | 2 | L A 41 | Land Arch Construction | 2 |
| Elective | | 3 | Elective | | 3 |
| | | 17 | | | 17 |

## Senior Year

| | | | | | |
|---|---|---|---|---|---|
| E I 102 | Prin of Outdoor Rec | 3 | E I 101 | Land Planning | 3 |
| L A 116a | Architecture | 3 | L A 116b | Architecture | 3 |
| L A 122 | Landscape Design | 6 | L A 123 | Landscape Design | 6 |
| L A 140 | Land Arch Construction | 2 | L A 141 | Land Arch Construction | 2 |
| Elective | | 3 | Elective | | 3 |
| | | 17 | | | 17 |

## LANDSCAPE ARCHITECTURE

Training in this curriculum develops ability in the planning of landscapes to secure the most desirable relationships among land forms, open space, structures, plantings and other elements to best serve utilitarian aims in an esthetically satisfying manner. The professional portion of the curriculum is primarily practice in design supported by study in construction and in plant materials. Other professionally-related courses are required and considerable opportunity is offered for electives in the sciences and the humanities.

The course of study is accredited by the American Society of Landscape Architects and is registered under the New York State law for licensure of landscape architects.

1. Chemistry 6a should be chosen by each student who has any uncertainty about continuing in the Landscape Architecture curriculum.
2. All Freshmen must complete the equivalent of College Algebra and Trigonometry; if qualified for further study more advanced mathematics may be taken in the first semester.

### ELECTIVES

1. At least one elective is to be chosen from each of categories A, B, and C.
    - A. Natural and Physical Sciences
        1. Botany
        2. Entomology
        3. Geology
        4. Physics
        5. Zoology
        6. Chemistry
        7. Mathematics
        8. Silviculture
    - B. Social Sciences
        1. Economics
        2. Geography
        3. History
        4. Political Science
        5. Sociology
        6. Citizenship
        7. Psychology
    - C. Humanities
        1. Philosophy
        2. Fine Arts
        3. English
        4. Classical Languages
        5. Romance Languages
        6. German
        7. Religion
2. A PRIME ELECTIVE must be chosen and shall consist of a group of related courses and be pursued for a minimum of four semesters or twelve hours.
3. All elective choices are to be made with the assistance and approval of a departmental counselor.

# PULP AND PAPER TECHNOLOGY

## Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 1 | Forest Botany | 4 | Chem 6b | General Chemistry | 4 |
| Chem 6a | General Chemistry | 4 | Engl 1 or 2 | Freshman English | 3 |
| Engl 1 or 2 | Freshman English | 3 | Graphics 2 | Technical Drawing | 2 |
| *Math | | 3 | *Math | | 3 |
| Orientation | | 0 | Elective | | 3 |
| Elective | | 3 | Phys Ed/ROTC | | 0 |
| Phys Ed/ROTC | | 0 | | | |
| | | 17 | | | 15 |

## Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 20a | Organic Chemistry | 3 | F Chem 20b | Organic Chemistry | 3 |
| F Chem 21a | Organic Chem Lab | 1 | F Chem 21b | Organic Chem Lab | 1 |
| F Econ 1 | Intro to Econ for Foresters | 3 | Engl 10b | Technical Writing | 2 |
| Engl 10a | Adv Comp & Lit | 2 | *Math/Elective | | 4/3 |
| *Math/Elective | | 3/4 | Phys 12 | Gen Phys for Sci Stu | 4 |
| Phys 11 | Gen Phys for Sci Stu | 4 | Elective (Acct.) | | 3 |
| | | 16/17 | | | 17/16 |

SOPHOMORE SUMMER EXPERIENCE—See course description. This practical experience must be obtained before registering for the Junior year.

## Junior Year

| | | | | | |
|---|---|---|---|---|---|
| A M 199 | Statistical Analysis | 3 | Chem 140b | Physical Chemistry | 3 |
| F Bot 2a | Dendrology | 2 | Chem 141b | Physical Chem Lab | 1 |
| Chem 132 | Quantitative Analysis | 2 | P&P 1b | Pulp and Paper Processes | 3 |
| Chem 133 | Quantitative Anal Lab | 1 | P&P 101 | Prin of Mass and Energy Balance | 3 |
| Chem 140a | Physical Chemistry | 3 | WPE 8 | Elem Wood Tech | 4 |
| Chem 141a | Physical Chem Lab | 1 | Elective | | 3 |
| P&P 1a | Pulp and Paper Processes | 3 | | | |
| | | 15 | | | 17 |

## Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 125a | Chem of Cellulose & Wood | 3 | F Chem 125b | Chem of Cellulose & Wood | 3 |
| F Chem 126 | Cellulose & Wood Chem Lab | 2 | P&P 5 | Mill Inspection Report | 1 |
| P&P 104a | P & P Unit Operations | 2 | P&P 104b | P & P Unit Operations | 3 |
| P&P 109 | Research Prob | 1 | P&P 108 | Economics of P & P | 2 |
| P&P 131 | Pulping Technology | 4 | P&P 110 | Research Prob | 4 |
| P&P 135 | Paper Properties | 4 | P&P 139 | Paper Technology Lab | 3 |
| Elective | | 3 | Elective | | 3 |
| | | 19 | | | 19 |

*Mathematics through Math 105b or equivalent is required.

## PULP AND PAPER TECHNOLOGY

This curriculum provides a background in the physical sciences (chemistry and physics), mathematics, and engineering, combined with a scientific understanding of the chemistry and anatomy of wood, pulping of wood, paper properties, and pulp and paper processing. The program permits the student to select additional courses on polymer chemistry and engineering.

## RESOURCES MANAGEMENT

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 1 | Forest Botany | 4 | Chem 6b | General Chemistry | 4 |
| Chem 6a | General Chemistry | 4 | Engl 1<br>or 2 | Freshman English | 3 |
| Engl 1<br>or 2 | Freshman English | 3 | *Math | | 3 |
| *Math | | 3 | F Zool 1 | General Zoology | 4 |
| Orientation | | 0 | Elective | | 3 |
| Elective | | 3 | Phys Ed/ROTC | | 0 |
| Phys Ed/ROTC | | 0 | | | |
| | | 17 | | | 17 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 2a | Dendrology | 2 | F Bot 2b | Dendrology | 1 |
| Graphics 1 | Technical Drawing | 1 | F Econ 2 | Intro to Macro-Econ | 3 |
| F Mgt 1 | Plane Surveying | 3 | Geol 1 | Introductory Geology | 3 |
| Phys 1a | General Physics | 4 | Phys 1b | General Physics | 4 |
| Electives | | 6 | Electives | | 6 |
| | | 16 | | | 17 |

SUMMER SESSION IN FIELD FORESTRY — 10 weeks — 10 credit hours. Required of all students following the Sophomore year and prior to registration for Junior year (including Junior year transfer students who elect this program).

| | | |
|---|---|---|
| F Biol 1 | Field Biology | 1 |
| F Mgt 3 | Forest Surveying | 2 |
| F Mgt 5 | Field Tech in Forest Mens | 2 |
| Silvi 1 | Silviculture | 1 |
| Silvi 2 | Applied Silviculture | 2 |
| Res Mgt 1 | Forest Resources Mgt | 2 |
| | | 10 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| A M 100<br>or<br>A M 110 | Elem Prob Stat<br><br>Statistical Theory | 3 | F Engr 102 | Mensuration | 3 |
| F Bot 10 | Plant Phys | 2 | F Ento 10 | Prin of F Ento | 2 |
| F Econ 3 | Intro to Micro-Econ | 3 | F Mgt 4 | Harvesting | 2 |
| Silvi 102<br>& 103 | Soils & Soils Lab | 3 | Silvi 101 | Prin of Silvi | 3 |
| Electives | | 6 | WPE 4 | Intro to F Prod | 2 |
| | | | Elective | | 3 |
| | | 17 | | | 15 |

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 40<br>or<br>Silvi 111<br><br>or<br>F Zool 100 | F Pathology (3)<br><br>Meteorology and Fire Behavior (2)<br><br><br>Prin of Wildlife Mgt (3) | 2/3 | E I 101<br>or<br>Silvi 110 | Prin of Outdoor Rec<br><br>Prin of Wtrshed Mgt | 3 |
| F Econ 101 | Prin of F Econ | 3 | F Mgt 106 | Mgt Plan & Ops | 3 |
| F Mgt 112 | F Admin & Policy | 3 | Res Mgt 102 | Res Management | 3 |
| Silvi 104 | Prac of Silvi | 3 | Electives | | 6 |
| WPE 6 | Elem Wood Tech | 2 | | | |
| Electives | | 3 | | | |
| | | 16/17 | | | 15 |

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*Six hours of mathematics are required: at least algebra and trigonometry. Two semesters of calculus are highly recommended to be taken prior to the Junior year, particularly for students interested in graduate work.

## RESOURCES MANAGEMENT

Designed to educate forest land managers, this curriculum presents the principles and practices basic to the many complex decisions involved in the management of varied forest lands for multiple use purposes with emphasis on timber, but including recreation, water, wildlife, and other forest land values.

There is a broad core of required courses and a system of electives which permits students to further explore subject areas of interest and develop academic depth. Attention has been given to developing and integrating the social, biological, and technical phases of forest land management and providing a general college education. The basic courses in this curriculum provide a sound foundation for graduate education in forestry and its allied fields. The four-year program, however, qualifies students for Society of American Foresters membership and meets educational requirements for federal and state forestry positions.

## GENERAL EDUCATION ELECTIVES — Required in the Forestry Core

1. Three elective courses (totalling 9 credits) must be selected from categories A and B with at least one course from each category.
    - A. Humanities
      1. Philosophy 2. Fine Arts 3. English 4. Classical Languages 5. Modern Languages
    - B. Social Sciences
      1. Economics 2. Geography 3. History 4. Political Science 5. Sociology 6. Citizenship 7. Psychology
2. Additional electives should be chosen from the above two categories or from natural and physical sciences not directly related to the course of study pursued by the student.
3. All elective choices are to be made with the assistance and approval of the faculty advisor.

## FORESTRY OR ALLIED SUBJECT ELECTIVES REQUIRED IN ADDITION TO THE CORE

Three additional courses (totalling 9 credits) must be selected from two of the forestry and allied subject areas listed. With special program purposes in mind, modification of these requirements and special course arrangements may be developed with the advisor. The forestry and allied subject areas for these electives are as follows:

1. Measurements — including mensuration, photogrammetry, engineering, computer programming, statistics.
2. Resources Planning and Development — including timber, watershed, recreation, wildlife and range management, economics, systems and operations analysis, management, environmental influences.
3. Administration — including public or business administration, law, industrial relations.
4. Applied Biology — including silviculture, forest influences, soils, protection, meteorology, tree improvement.
5. Conservation — including conservation education, forestry extension.
6. World Forestry — including resources, institutions, trade and industry.

## SUMMARY OF VARIOUS CREDIT REQUIREMENTS IN THE RESOURCES MANAGEMENT CURRICULUM

General Education Requirement (60 semester hours required by State Ed. Dept.)

*Courses in Core*

| | | | |
|---|---|---|---|
| English | 6 | Soils | 3 |
| Economics | 6 | Chemistry | 8 |
| Mathematics | 6 | Physics | 8 |
| Geology | 3 | Botany | 9 |
| | | Zoology | 4 |
| | | | 53 |

### ADDITIONAL GENERAL EDUCATION ELECTIVES REQUIRED

| | | |
|---|---|---|
| 2 electives in one Category | 6 | |
| 1 elective in the second Category | 3 | |
| | 9 | 9 |
| | | 62 |

### FORESTRY OR ALLIED AREA ELECTIVES

| | |
|---|---|
| 2 electives in a subject area | 6 |
| 1 elective in another subject area | 3 |
| | 9 |

| | |
|---|---|
| Core requirements (including 10-credit summer camp) | 104-105 |
| General education course requirements beyond the core | 9 |
| Forestry or allied subject electives beyond the core | 9 |
| Electives | 18 |
| | 140-141 |

## MANUFACTURING AND MARKETING OPTION

### Freshman Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| F Bot 1 | Forest Botany | 4 | Chem 6b | General Chem | 4 |
| Chem 6a | General Chem | 4 | Engl 1 or 2 | Freshman English | 3 |
| Engl 1 or 2 | Freshman English | 3 | Graphics 2 | Technical Drawing | 2 |
| *Math | | 3 | *Math | | 3 |
| Orientation | | 0 | F Zool 1 | General Zoology | 4 |
| Elective | | 3 | Phys Ed/ROTC | | 0 |
| Phys Ed/ROTC | | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| Acct 1 | Elem Accounting | 3 | **Acct 2 Elec | Elem Accounting | 3 |
| F Bot 2 | Dendrology | 2 | Engl 10b | Tech Writing | 2 |
| F Econ 1 | Intro to Econ | 3 | *Math | | 3 |
| Engl 10a | Adv Comp & Lit | 2 | Phys 1b | General Physics | 4 |
| *Math | | 3 | WPE 8 | Elem Wood Tech | 4 |
| Phys 1a | General Physics | 4 | | | |
| | | 17 | | | 16 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 22 | Mech Process I | 3 | A M 199<br>or<br>Bus Stat 1 | Statistical Analysis<br>Basic Statistics | 3 |
| WPE 100 | Phys & Mech Prop of Wood | 4 | WPE 122 | Mechanical Processing II | 3 |
| WPE 132 | Adhesion and Adhesives | 4 | WPE 142 | Wood-Water Relationships | 3 |
| Electives | | 6 | Electives | | 6 |
| | | 17 | | | 15 |

JUNIOR SUMMER TRIP AND EXPERIENCE

| | | |
|---|---|---|
| WPE 52 | Wood Prod Eng Summer Exp | 5 |
| ***WPE 152 | Wood Prod Eng Field Trip | 2 |
| | | 7 |

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 162 | Wood Preservation | 3 | WPE 138 | Wood Coating Tech | 3 |
| Electives | | 12 | WPE 170 | Case Studies | 2 |
| | | | Electives | | 10 |
| | | 15 | | | 15 |

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*Mathematics through Math 105a is required.

**Accounting 2, 3 credit hours, required for Marketing majors.

***This two-week trip begins the second week of the examination period at the end of the Junior year.

## WOOD PRODUCTS ENGINEERING

Two broad options are available in this curriculum: Science, and Manufacturing and Marketing. Each offer several areas of specialization to meet the interests and needs of students.

### *Manufacturing and Marketing Option*

The manufacturing specialization provides a foundation in the basic sciences and in the application of technological and industrial engineering methods to wood products. Areas of study include wood structure, properties, and behavior, industrial processing, and utilization; industrial organization; production management; quality control; motion and time study; materials handling; economic analysis; personnel and industrial relations; transportation and marketing, business administration, and computer applications. The marketing specialization prepares graduates for the commercial and industrial distribution of wood-based and related products and services. The program is a combination of the basic physical sciences, applied technologies, and courses in the student's area of interest. Areas of study include: wood structure, properties, and behavior, industrial processing, and utilization; business organization and management; marketing and advertising; accounting and finance; business law; transportation; materials handling; materials and construction; industrial engineering; personnel and industrial relations, and computer applications.

## SCIENCE OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 1 | Forest Botany | 4 | Chem 6b | General Chemistry | 4 |
| Chem 6a | General Chemistry | 4 | Engl 1 or 2 | Freshman English | 3 |
| Engl 1 or 2 | Freshman English | 3 | Graphics 2 | Technical Drawing | 2 |
| *Math | | 3 | *Math | | 3 |
| Orientation | | 0 | F Zool 1 | General Zoology | 4 |
| Elective | | 3 | Phys Ed/ROTC | | 0 |
| Phys Ed/ROTC | | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 2a | Dendrology | 2 | F Chem 20b | Organic Chem | 3 |
| F Chem 20a | Organic Chem | 3 | F Chem 21b | Organic Chem Lab | 1 |
| F Chem 21a | Organic Chem Lab | 1 | Engl 10b | Technical Writing | 2 |
| Engl 10a | Adv Comp & Lit | 2 | *Math | | 3 |
| *Math | | 3 | Phys 1b | General Phys | 4 |
| Phys 1a | General Phys | 4 | WPE 8 | Elem Wood Tech | 4 |
| | | 15 | | | 17 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Econ 1 | Intro to Econ | 3 | A M 199 | Statistical Analysis | 3 |
| WPE 100 | Phys & Mech Prop of Wood | 4 | WPE 122 | Mechanical Processing II | 3 |
| Electives | | 9 | Electives | | 11 |
| | | 16 | | | 17 |

JUNIOR SUMMER TRIP AND EXPERIENCE

| | | |
|---|---|---|
| WPE 52 | Wood Products Eng Summer Experience | 5 |
| **WPE 152 | Wood Products Eng Field Trip | 2 |
| | | 7 |

### Senior Year

| | | | |
|---|---|---|---|
| ***Chemistry | 4 | ***Chemistry | 4 |
| Electives | 11 | WPE 101 | 3 |
| | | Electives | 8 |
| | 15 | | 15 |

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*Mathematics through Math 105a is required. However, students intending to specialize in the physical science aspects normally complete Math 105c.

**This two-week trip begins the second week of the examination period at the end of the Junior year.

***A sequence of two semesters of biochemistry, cellulose, polymer or physical chemistry is required.

**Science Option**

The many new and unusual wood-based materials developed in recent years require wood scientists to have knowledge in the areas of chemical properties, physical properties, and anatomical structure. This option was developed for students with varied interests, and provides the opportunity for selection of courses in these areas: plant anatomy, plant physiology, systematic botany, microtechnique, photomicrography, cellulose chemistry, cellular ultrastructure, anatomy of foreign woods, differential equations, advanced general physics, solid-state physics, physical chemistry, strength of materials, polymer chemistry, advanced mechanics, and theory of elasticity.

## TRANSFERS FROM ENGINEERING SCIENCE PROGRAMS IN UNITS OF STATE UNIVERSITY OF NEW YORK

Two-Year Colleges Participating in the Uniform Program of Basic Engineering Studies (Engineering Science) Developed in Cooperation with the Association of Engineering Colleges of New York State as of February 7, 1965 are listed below.

### COLLEGES

Corning Community College at Corning
Dutchess Community College at Poughkeepsie
Hudson Valley Community College at Troy
Jefferson Community College at Watertown
Monroe Community College at Rochester
Nassau Community College at Garden City
Onondaga Community College at Syracuse
Rockland Community College at Suffern
State University Agricultural and Technical College at Alfred
State University Agricultural and Technical College at Canton
State University Agricultural and Technical College at Morrisville
Suffolk County Community College at Selden
Ulster County Community College at Kingston
State University Agricultural and Technical College at Farmingdale

Qualified students who have completed the Engineering Science Curriculum at any of the SUNY units listed above may transfer to one of the following curriculums at the College of Forestry.

FOREST CHEMISTRY
  Biochemistry Option
  Wood and Polymer Chemistry Option

FOREST ENGINEERING

PULP AND PAPER TECHNOLOGY

WOOD PRODUCTS ENGINEERING
  Manufacturing and Marketing Option
  Science Option

Upon satisfactory completion of the recommended program at the two-year SUNY unit as outlined below they would enter at the junior level and follow the curriculum at the College of Forestry as especially set up for such transfers.

# FIRST TWO YEARS
# ENGINEERING SCIENCE CURRICULUM

## Courses Given at Two-Year SUNY Units

### FIRST YEAR

#### Semester 1

| *Course* | *Credit* |
|---|---|
| English Composition I | 3 |
| Analytic Geometry and Calculus I | 4 |
| Physics | 4 |
| General Chemistry I | 4 |
| Engineering Graphics I | 2 |
| Physical and Health Ed | 1 |
| | 18 |

#### Semester 2

| *Course* | *Credit* |
|---|---|
| English Composition II | 3 |
| Analytic Geometry and Calculus II | 4 |
| Physics II | 4 |
| General Chemistry II | 4 |
| Engineering Graphics | 2 |
| Physical and Health Ed | 1 |
| | 18 |

### SECOND YEAR

#### Semester 3

| *Course* | *Credit* |
|---|---|
| Principles of Economics I* *or* History of Western Civilization I | 3 |
| Analytic Geometry and Calculus III | 4 |
| Physics III | 3 |
| Statics | 3 |
| Elective** | 4 |
| Physical and Health Ed | 1 |
| | 18 |

#### Semester 4

| *Course* | *Credit* |
|---|---|
| Principles of Economics II* *or* History of Western Civilization II | 3 |
| Differential Equations | 4 |
| Physics IV | 3 |
| Dynamics | 3 |
| Elective** | 3 |
| Physical and Health Ed | 1 |
| (Elective—Speech or Intro to Lit) | (2-3) |
| | 17<br>(19-20) |

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*ECONOMICS required: *two* semesters for FOREST ENGINEERING, *one* semester for others.

**ORGANIC CHEMISTRY, 4 credits each semester, required for all except FOREST ENGINEERING. GENERAL EDUCATION (Social Science or Philosophy) 3 credits each semester required for FOREST ENGINEERING.

# FOREST CHEMISTRY

*(Curriculum for Engineering Science Transfers from SUNY Units)*

## Biochemistry Option Junior Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Bot 1 | Forest Botany | 4 |
| F Bot 2a | Dendrology | 2 |
| Chem 132 | Quantitative Analysis | 2 |
| Chem 133 | Quantitative Analysis Lab | 1 |
| Chem 140a | Physical Chemistry | 3 |
| Chem 141a | Physical Chemistry Lab | 1 |
| Elective | | 3 |
| | | 16 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| Chem 134 | Instrumental Methods | 2 |
| Chem 135 | Instrumental Methods Lab | 1 |
| Chem 140b | Physical Chemistry | 3 |
| Chem 141b | Physical Chemistry Lab | 1 |
| F Zool 1 | General Zoology | 4 |
| *Elective | | 3 |
| Mathematics Elective | | 3 |
| | | 17 |

## Biochemistry Option Senior Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Bot 105 | Fundamentals of Genetics | 4 |
| F Chem 109a | Intro to Research | 1 |
| F Chem 125a | Chem of Cellulose & Wood | 3 |
| F Chem 126 | Chem of Cell & Wood Lab | 2 |
| F Chem 130a | Biochemistry | 3 |
| F Chem 131 | Biochemistry Lab | 2 |
| **Biol Elective | | 3 |
| | | 18 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| F Chem 109b | Intro to Research | 6 |
| F Chem 114 | Undergraduate Seminar | 1 |
| F Chem 130b | Biochemistry | 3 |
| *Pub Add 51 | Public Speaking | 3 |
| **Biol Elective | | 3 |
| | | 16 |

## Wood and Polymer Chemistry Option Junior Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Bot 1 | Forest Botany | 4 |
| F Bot 2a | Dendrology | 2 |
| Chem 132 | Quantitative Analysis | 2 |
| Chem 133 | Quantitative Analysis Lab | 1 |
| Chem 140a | Physical Chemistry | 3 |
| Chem 141a | Physical Chemistry Lab | 1 |
| Mathematics Elective | | 3 |
| | | 16 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| Chem 134 | Instrumental Methods | 2 |
| Chem 135 | Instrumental Methods Lab | 1 |
| Chem 140b | Physical Chemistry | 3 |
| Chem 141b | Physical Chemistry Lab | 1 |
| *Pub Add 51 | Public Speaking | 3 |
| WPE 8 | Elementary Wood Technology | 4 |
| Elective | | 3 |
| | | 17 |

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*Elective, if credit for Speech is transferred.

**3 hours have to be in Physiology; for the other, a course in structural and/or developmental biology is recommended.

## Wood and Polymer Chemistry Option Senior Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Chem 109a | Introduction to Research | 1 |
| F Chem 121 | Intro to Polymer Chemistry | 3 |
| F Chem 124 | Polymer Techniques Lab | 2 |
| F Chem 125a | Chem of Cellulose & Wood | 3 |
| F Chem 126 | Chem of Cellulose Lab | 2 |
| Elective | | 3 |
| Choice of: | | |
| F Chem 130a | Biochemistry | 3/4 |
| or | | |
| P&P 1a | Pulp and Paper Processes | |
| or | | |
| WPE 100 | Physical and Mechanical Properties of Wood | |
| | | 17/18 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| F Chem 109b | Introduction to Research | 6 |
| F Chem 114 | Undergraduate Seminar | 1 |
| F Chem 122 | Polymer Properties & Processing | 3 |
| F Chem 125b | Chem of Cellulose & Wood | 3 |
| Elective | | 3 |
| | | 16 |

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# FOREST ENGINEERING

*(Curriculum for Engineering Science Transfers from SUNY Units)*

## Forest Engineering Junior Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| A M 110 | Statistics | 3 |
| A M 150 | Intro to Comp Program | 3 |
| F Bot 1 | Forest Botany | 4 |
| F Bot 2a | Dendrology | 2 |
| Silvi 111 | Meteorology and Fire Behavior | 3 |
| Geol 1 | Introductory Geology | 3 |
| | | 18 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| F Bot 2b | Dendrology | 1 |
| F Engr 101 | Surveying | 3 |
| F Engr 106 | Hydrology | 3 |
| F Engr 103 | Photogrammetry | 3 |
| C E 120 | Mechanisms of Deformable Bodies | 3 |
| Silvi 101 | Prin of Silvi | 3 |
| | | 16 |

## Forest Engineering Senior Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Econ 101 | Prin of For Econ | 3 |
| C E 180 | Soil Mechanics | 3 |
| F M 112 | Forest Policy and Adminis | 3 |
| F Engr 105 | Structures | 3 |
| F Engr 111 | Production Prin | 3 |
| Elective: | | 3 |
| Math 181 | Higher Math for Engrs | |
| or | | |
| C E 210 | Analytical Photogrammetry I | |
| | | 18 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| F M 106 | Mgt Planning and Operations | 3 |
| F Engr 102 | Mensuration | 3 |
| F Zool 1 | General Zoology | 4 |
| Elective (legal concepts) | | 3 |
| Elective: | | 3 |
| C E 162 | Structures | |
| or | | |
| I E 162 | Analytical Methods in I E | |
| or | | |
| C E 211 | Analytical Photogrammetry II | |
| | | 16 |

## PULP AND PAPER TECHNOLOGY

*(Curriculum for Engineering Science Transfers from SUNY Units)*

### Pulp and Paper Technology Junior Year

Summer Experience in Paper Industry
P & P 4 — 5 Credit Hours

It is preferable that P & P 4 be complete before beginning the work of the Junior Year. In the case of transfers however, this may be postponed with the permission of the Department Head until the summer following the Junior Year.

| *First Semester* | | *Credit Hours* |
|---|---|---|
| A M 199 | Statistical Analysis | 3 |
| F Bot 1 | Forest Botany | 4 |
| Chem 132 | Quantitative Analysis | 2 |
| Chem 133 | Quantitative Anal Lab | 1 |
| Chem 140a | Physical Chemistry | 3 |
| Chem 141a | Physical Chemistry Lab | 1 |
| P&P 1a | Pulp and Paper Processes | 3 |
| | | 17 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| Chem 140b | Physical Chemistry | 3 |
| Chem 141b | Physical Chemistry Lab | 1 |
| P&P 1b | Pulp and Paper Processes | 3 |
| P&P 101 | Prin of Mass and Energy Balance | 3 |
| WPE 8 | Elem Wood Technology | 4 |
| Elective | | 3 |
| | | 17 |

### Pulp and Paper Technology Senior Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Chem 125a | Chem of Cell & Wood | 3 |
| F Chem 126 | Cell & Wood Chem Lab | 2 |
| P&P 104a | P & P Unit Operations | 2 |
| P&P 109 | P & P Research Problem | 1 |
| P&P 131 | Pulping Technology | 4 |
| P&P 135 | Paper Properties | 4 |
| Elective | | 3 |
| | | 19 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| F Chem 125b | Chem of Cell & Wood | 3 |
| P&P 5 | Mill Inspection Report | 1 |
| P&P 104b | P & P Unit Operations | 3 |
| P&P 108 | Economics of P & P | 2 |
| P&P 110 | Research Problem | 4 |
| P&P 139 | Paper Technology Lab | 3 |
| Elective | | 3 |
| | | 19 |

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## WOOD PRODUCTS ENGINEERING

*(Curriculum for Engineering Science Transfers from SUNY Units)*

### Manufacturing and Marketing Option Junior Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Bot 1 | Forest Botany | 4 |
| F Bot 2a | Dendrology | 2 |
| WPE 22 | Mechanical Processing | 3 |
| WPE 100 | Mech and Phys Properties of Wood | 4 |
| WPE 132 | Adhesion & Adhesives | 4 |
| | | 17 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| A M 199<br>or<br>Bus Stat 1 | Statistical Analysis<br>Basic Statistics | 3 |
| WPE 8 | Elem Wood Technology | 4 |
| WPE 122 | Mech Processing II | 3 |
| WPE 142 | Wood-Water Relationships | 3 |
| Elective | | 3 |
| | | 16 |

### JUNIOR SUMMER TRIP AND EXPERIENCE

| | | *Credit Hours* |
|---|---|---|
| WPE 52 | Wood Products Engineering Summer Experience | 5 |
| *WPE 152 | Wood Products Engineering Field Trip | 2 |
| | | 7 |

## Manufacturing and Marketing Option Senior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| Acct 1 | Elementary Accounting | 3 | WPE 138 | Wood Coating Technology | 3 |
| WPE 162 | Wood Preservation | 3 | WPE 170 | Case Studies | 2 |
| Electives | | 9 | **Electives | | 10 |
| | | 15 | | | 15 |

## Science Option Junior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| A M 199 | Statistical Analysis | 3 | WPE 8 | Elem Wood Technology | 4 |
| F Bot 1 | Forest Botany | 4 | WPE 122 | Mech Processing II | 3 |
| F Bot 2a | Dendrology | 2 | Electives | | 9 |
| WPE 100 | Mech & Phys Prop of Wood | 4 | | | 16 |
| Elective | | 3 | | | |
| | | 16 | | | |

### JUNIOR SUMMER TRIP AND EXPERIENCE

| | | *Credit Hours* |
|---|---|---|
| WPE 52 | Wood Products Engineering Summer Experience | 5 |
| *WPE 152 | Wood Products Engineering Field Trip | 2 |
| | | 7 |

## Science Option Senior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| ***Chemistry | | 4 | ***Chemistry | | 2/3 |
| Electives | | 11 | WPE 101 | Research Problems | 3 |
| | | 15 | Electives | | 9/10 |
| | | | | | 15 |

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*This two-week trip begins the second week of the examination period at the end of the Junior year.

**Accounting 2, 3 credit hours, required for Marketing majors.

***A sequence of two semesters of biochemistry, cellulose, polymer, or physical chemistry is required.

# VI

# GRADUATE STUDY

The stimulating interaction of faculty and students diligently seeking new understandings and solutions to the challenging problems of modern science and technology creates the major background for graduate study at the College. In addition, a wide array of excellent supporting facilities and equipment completes the setting for creative study. In this environment the student takes a concentrated program of advanced courses designed to meet his professional needs and academic objectives as a prelude to original investigation. Emphasis in graduate study is placed on research and related creative achievement. The student's intellectual horizons further expand as he participates in seminars and colloquia with faculty and visiting scholars.

Graduate study is a time when a student develops his ability to think critically and analytically, to design experiments and plan research, to work with specialized equipment, to use a library effectively, and to accept the rigorous discipline of purposeful study toward a specific goal. It is a time of discovery and excitement, of answers and new insights — the realization of personal creativity and the deep satisfaction of scholarship.

The demand for scientists and scholars by industrial, governmental, and educational organizations is increasing rapidly in the College's broad areas of graduate study centering around forest resources, their products, and supporting science disciplines. Education through the doctorate is generally expected of those planning to enter college or university teaching. The Master's or Doctor's degree is a frequent requirement for many industrial or governmental research positions and more employers are seeking graduates with one or more advanced degrees for management positions. But a graduate education is more than a positional requirement. Our society is increasingly in the hands of men who have skill in applying technical knowledge to guide human and economic forces. Modern civilization requires men who can think objectively and constructively, and who can act creatively and responsibly.

## RESEARCH

Graduate education and research are so mutually dependent upon each other, that they must be considered together for a realistic understanding of the College's program. Research is a major responsibility of the College required by its charter, and has been traditionally an integral part of its total academic effort.

The objectives of the College in carrying out a vigorous research program are to provide education in science and technology; to provide an environment for professional growth, the development of creative thought, and the mastery of investigative techniques; and to create new knowledge, providing a growing resource of information for the people of New York and the nation for the better management, use and enjoyment of natural resources and their many products. The latter objective constitutes an obligation and responsibility of the College, as a publicly supported professional institution, relating to our great forest resources.

To support these objectives and obligations the State University of New York provides a budget for Organized Research which is currently about $600,000 annually. In addition, extra-mural research support in the form of grants and contracts amounts to about $750,000 annually. This extra-mural support comes from National Science Foundation, Department of Defense, National Institutes of Health, the McIntire-Stennis Program of the U.S.D.A., the U. S. Forest Service, New York Conservation Department, other government agencies, private foundations and industry.

Much graduate student research work is directly related to continuing programs of faculty research, and in many cases graduate students receive financial assistance from these programs.

Several research institutes and centers have been established at the College to promote research. These include the Empire State Paper Research Institute (supported by 45 companies in 12 countries), the Cellulose Research Institute, the State University Water Resources Center, the State University Polymer Research Center, and the World Forestry Institute. The United States Forest Service cooperates with the College through the Cooperative Watershed Management Research Unit and the Cooperative Forest Recreation Unit. In each of these cooperative units Forest Service personnel are assigned to the College and work directly with the faculty in developing research programs.

Sponsored research at the College is administered through the Research Foundation of State University of New York, a private corporation chartered by the Board of Regents. It encourages and administers independent financing of research by State University personnel and with State University facilities.

## GRADUATE DEGREES

The College of Forestry offers graduate education in professional and scientific fields leading to the Master of Science, Master of Forestry, Master of Landscape Architecture, and the Doctor of Philosophy degrees.

## GRADUATE PROGRAMS

Graduate education may be pursued at the College in each of the 11 departments represented here. In addition, there is wide opportunity for interdepartmental graduate programs at the College or at adjacent Syracuse University.

General programs follow, and are arranged alphabetically by these titles: Forest Botany and Pathology, Forest Chemistry (Polymers, Natural Products, Biochemistry), Forestry Economics, Forest Entomology, Forest Management (including Engineering, Recreation), Forest Zoology (including Wildlife Management), Landscape Architecture, Pulp and Paper Technology, Silviculture (including Soils, Tree Improvement, Water Resources), Wood Products Engineering, and World Forestry.

## FOREST BOTANY AND PATHOLOGY

TEPPER, *Chairman* (Anatomy and Morphogenesis); KETCHLEDGE (Ecology and Bryology); LOWE (Mycology); MCDOWELL (Fungus Physiology); MORRISON (Taxonomy); SCHAEDLE (Physiology); SILVERBORG (Pathology); VALENTINE (Genetics); WANG (Mycology); WILCOX (Physiology); ZABEL (Pathology).

The program in botany and pathology is designed to provide students with a course of instruction in basic botanical and related natural and physical sciences. Research and thesis problems are generally designed to utilize forest organisms in the development of biological knowledge. Graduate programs are offered in the fields of anatomy and morphogenesis, physiology, ecology, forest pathology, wood deterioration, mycology, genetics, and taxonomy. Minors may be taken as combinations of these or other fields at the College, such as zoology, entomology, soils, wood chemistry, biochemistry, and wood engineering. Strong supporting courses in bacteriology, microbiology, genetics, mathematics, chemistry, and statistics, available at Syracuse University, provide additional courses for graduate program.

Students interested in programs of study directed toward broad biological applications or resource ecology (i.e., environmental biology, tree pest control, conservation ecology, etc.) may elect to take a Master of Forestry degree to achieve these aims.

Current areas of active research by departmental faculty are: *anatomy and morphogenesis,* factors that influence the development and form of root systems, that determine the dimensions of woody plant cells and that control the development of root and shoot apices; *physiology,* chemical regulation of organ growth, cell differentiation in tissue culture, the nature and physiology of mycorrhizae, ion transport, mineral nutrition and biochemical aspects of cambial physiology;

*ecology,* dynamics of plant communities in the Adirondack Mountain Region and on the Alleghany Plateau, the influence of man on plant communities, the interaction of environmental factors during vegetational change; *forest pathology,* diseases of forest plantations, heart-rots and cankers, tree rusts and physiogenic diseases; *wood deterioration,* the effects of stains and decays on wood use and their controls, the chemistry of wood decay, toxicity mechanisms, and the bioassay of toxicants; *mycology,* the taxonomy, physiology, sexuality and cultural characteristics principally of wood-inhabiting fungi; *genetics,* quantitative and population genetics, the heritability and natural variations in wood characteristics that are important in forest products and wood pulp; *taxonomy,* the identification, nomenclature and classification of bryophytes and vascular plants.

A new $5 million Biological Sciences Building provides faculty and students with modern facilities for botanical research. Special facilities include rooftop greenhouses; phytotrons; growth chambers; an electron microscope; herbaria and special research laboratories for tissue culture, microchemisty, microtechnique, microscopy, radiochemistry, chromatography, and computation. In addition a cobalt-60 source and an IBM 1620 computer are available at the College for student use. Extensive College forests, including most forest types of the Northeast, plantations and nurseries offer exceptional opportunities for field study of forest plants and diseases.

Research in the department is supported by private industry, the United States Forest Service, the Conservation Department, the Research Foundation of the State of New York, a variety of Federal agencies and by the State. In addition to direct project support, the grantees also provide for graduate research assistantships.

## FOREST CHEMISTRY (POLYMERS, NATURAL PRODUCTS, BIOCHEMISTRY)

Schuerch, *Chairman* (Wood and Polymer Chemistry); Jagur (Physical and Polymer Chemistry); Jahn (Forest and Wood Chemistry); La Londe (Organic and Natural Products Chemistry); Marchessault (Physical and Polymer Chemistry); Smid (Physical and Polymer Chemistry); Sondheimer (Biochemistry); Szwarc (Physical and Polymer Chemistry); Timell (Carbohydrate and Wood Chemistry); Walton (Biochemistry).

Recent years have seen profound advances in the fundamental knowledge of chemical areas which have special significance to forestry. Therefore, this department is very active in the following research areas: polymer chemistry, wood chemistry, biochemistry, chemistry of natural products, and organic material sciences.

Requirements for an M.S. or Ph.D. degree in chemistry include a research project and thesis, along with an appropriate program of courses at the College and at Syracuse University. Generous financial support is available in the form of fellowships, teaching assistantships, and tuition waivers to qualified students and to postdoctoral fellows.

Specific projects may vary from year to year, since they reflect the current interests of the department members. Current research projects with physiochemical emphasis are: the chemistry, solid state, and solution properties of natural and synthetic polymers; chemistry of free radicals, radical ions and charge-transfer processes; crystal structure and morphology of cell wall constituents. Current organic chemistry programs deal with synthesis of special polymers such as graft, block, stereoregular deuterated vinyl polymers, linear polysaccharides, various aspects of alkaloid chemistry and the chemistry of compounds having strained bonds. An active program on the structure and degradation of the polymeric wood components, hemicelluloses, lignins and celluloses, is underway. In biochemistry, department members are studying: mechanisms of action of plant growth hormones, biochemical regulation of seed germination, plant enzymology, chemistry and biochemistry of plant phenols, and structure and metabolism of terpenoids in higher plants and microorganisms.

Graduate research laboratories in the Hugh P. Baker Laboratory are well equipped for polymer studies, chemical and biochemical research. Instrumentation includes analytical and preparative ultracentrifuges, Warburg respirometer, recording infrared and ultraviolet spectrophotometers, mass spectrometer, differential refractometer, electron spin resonance spectrometer, nuclear magnetic resonance spectrometer with spin decoupler, recording polarimeter, electron microscope, X-ray diffraction, chromatography and cold laboratories, and radiochemical laboratories with counters for solids, liquids and gases.

## FORESTRY ECONOMICS

DUERR, *Chairman* (Forestry Economics); ARMSTRONG (Forestry Economics); CHRISTIANSEN (Forestry Economics).

The fields of special competence of the Department's six teaching-faculty members are (1) economics theory, economic thought in forestry; (2) managerial economics of forestry, forest resource analysis; (3) economics of forest production, systems and operations analysis; (4) forestry industry economics and resource analysis; (5) economics of forest products marketing and distribution; (6) economics of demand and consumption of timber, recreational services, and other forest values.

The Department of Forestry Economics offers three basic graduate programs: a Master of Forestry program designed to give the prospective professional forester or product technologist general competence in making economic decisions and in appraising economic events and policies; a Master of Science program stressing the tools of economic research and their applications, designed for foresters, technologists, research workers, and potential teachers who may later wish to do more graduate work; and a program leading to the Doctor of Philosophy degree in the economics of forestry.

Course work at the College of Forestry is supplemented by courses available in general economics, mathematics, operations research, business, international affairs, and related fields at the Maxwell Graduate School of Citizenship and Public Affairs, the College of Business Administration, and other units of Syracuse University. The wide facilities of both Syracuse University and the College of Forestry may be drawn upon by the student to supplement his education in allied social sciences or to strengthen his grounding in technical forestry fields.

Graduate research within the Department covers a broad spectrum. Examples of topics recently treated are: applications of operations research in the marketing of pulpwood and in the manufacture of lumber; public forestry decision-making with the aid of input-output analysis; marketing problems in the printing-paper industry; forestry investments in the face of uncertainty; the financing of public recreational improvements; and forestry investment criteria in newly developing nations.

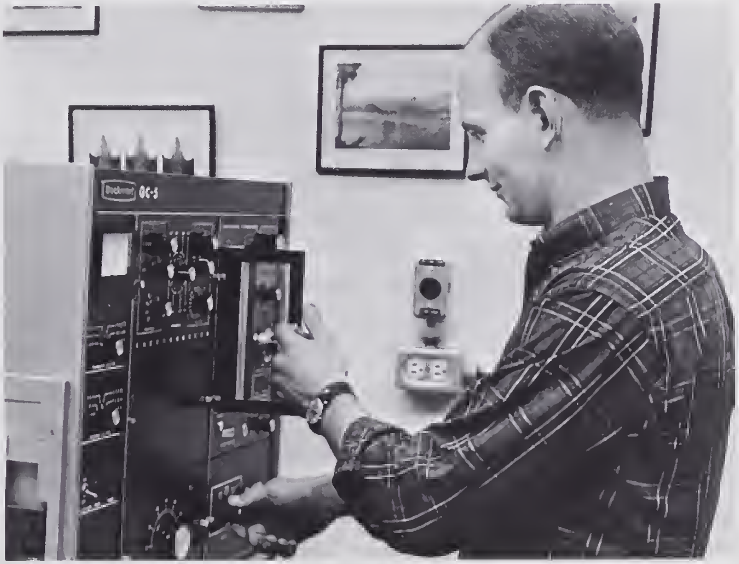
## FOREST ENTOMOLOGY

SIMEONE, *Chairman* (Ecology and Morphology); BREZNER (Physiology and Toxicology); GARA (Ecology and Behavior); KRALL (Bionomics, Taxonomy, and Histology); KURCZEWSKI (Taxonomy, Behavior, and Morphology).

Broad opportunities for study in forest entomology are available for the graduate student who, with the advice of his major professor, is permitted to follow a program of research supplemented by appropriate course work at this College and at Syracuse University. Research specializations include fields of insect ecology, morphology, taxonomy, histology, physiology, biochemistry, and toxicology as these relate to insects affecting forest, shade and ornamental trees, logs, lumber, and wood products. Selected problems may also concern chemical, biological and silvicultural aspects of insect control.

The Department is well equipped for most phases of entomological research. A greenhouse, insectary, and a wide range of constant temperature facilities permit year-long biological studies under controlled conditions. Modern analytical equipment permits the most precise study of physiological, biochemical, and toxicological problems. The entomological museum contains an extensive collection of forest insects attractive to students of taxonomy and classification. Excellent optical equipment is available for advanced work in taxonomy, morphology and histology, including an electron microscope. The Entomology Department will be housed in the new $5 million Biological Sciences Building. This facility will provide faculty and students with modern facilities for entomological research. Facilities and instruction are available at this College and at Syracuse University in macro- and microphotography. College-maintained forests, some provided with living quarters, are readily accessible for field studies of insects.

Cooperative problems involving other departments at this College and Syracuse University may be arranged, as, for example, in plant pathology, physiology and ecology. Additional opportunities are in such fields as genetics, immunology, climatology, and radio chemistry. Split majors and minors are encouraged.



## FOREST MANAGEMENT

GETTY, *Chairman* (Forest Administration, and Policy); BICKFORD (Statistics); GRAVES (Forest Policy, Management, and Recreation); HORN (Forest Management); LEE (Systems Analysis, and Computer Center Director); KOTEN (Engineering); STANTON (Engineering, and Photogrammetry).

Graduate programs may be broadly integrative in scope, serving the potential manager's need for understanding and coordination of policy, economics, engineering, and business with technical forestry activities. Or they may be more specialized within one of the major subject fields comprising the over-all function of forest resource management. The strong trend toward intensification of management practices by industrial and public agencies provides an ever-growing demand for high-quality personnel with each of these types of educational preparation. Both Master's and Doctoral programs provide opportunity and encouragement for the student to attain his full potential for future service.

The Department offers a variety of graduate professional courses, and encourages students to make timely use of related subject matter in other fields. The broad resources and facilities of the College of Engineering, the College of Business Administration, the Maxwell Graduate School of Citizenship and Public Affairs program of public administration, and other units of Syracuse University provide exceptional opportunities. Courses at Syracuse University and in many subject specializations at the College of Forestry are frequently utilized to round out interests and strengthen abilities. The U. S. Forest Service Recreation Research Unit for the Northeastern Region is located at the College in association with the Department and cooperates in research and graduate study.

Faculty members in the Department promote the spirit of free inquiry into management problems. Flexibility is encouraged. Joint programs involving the carrying of a minor in another department, designed to bring appropriate balance into the student's conceptions for better use of planning analysis, are common.

Subject areas include industrial and public forest resource policy, program planning for permanent management of forests for various uses including outdoor recreation, valuation and appraisal in land and timber management, methods of inventory, determining growth and yield, locational design and cost analyses for development and maintenance of roads, regulation of multiple-market production and harvesting, logging and cost control, business management concepts, administrative organization and fiscal control, and analyses of public and industrial forestry activities.

The Department also is well-equipped with staff and facilities supporting advanced study in forest recreation, forest measurement and mapping, aerial photogrammetry, and forest engineering. Special programs in personnel and budgetary aspects of forestry are proving increasingly useful. Many of the subject areas are supplemented by case studies and visits to industrial and public operations.

## FOREST ZOOLOGY

ALEXANDER, *Chairman* (Vertebrate Ecology and Wildlife Management); HARTENSTEIN (Physiology and Invertebrates); PATRIC (Vertebrate Ecology and Wildlife Management); WEBB (Vertebrate Ecology and Wildlife Management).

Graduate studies in forest zoology include both basic and applied research on animals of the forest, including its associated soils and related natural areas. Programs are offered in vertebrate ecology, soil invertebrate ecology, physiology, animal behavior, wildlife biology, wildlife management, and aquatic ecology.

Facilities of the Department include its modern physiological and other zoological laboratories, the library, and the vertebrate collection of the Roosevelt Wildlife Forest Experiment Station, the Huntington Wildlife Forest, and extensive field research equipment. The Zoology Department is moving into a new $5 million Biological Sciences Building. This facility will provide faculty and students with modern facilities for zoological research. Field research also can be conducted on the College-owned Heiberg Forest and Experiment Station. Within a 35-mile radius of Syracuse are several areas available for research ranging up to 7,000 acres in size. These include Onondaga County's Highland Forest and Carpenter Creek Fish Hatchery, State Conservation Department's game management areas — Tioughnioga, Three Rivers, Howland Island, and Cicero; and the Montezuma National Wildlife Refuge.

All these facilities and areas available to the Department are supplemented by the services and facilities of the College's other departments. Also available are the facilities of adjacent Syracuse University. Their large departments of Zoology, emphasizing physiology and developmental zoology; Geography, including land use; Sociology; Political Science; Engineering, including sanitation engineering and water pollution control, all add to both a broad foundation for basic and applied zoological research and an opportunity for specialization.

The campus of the Upstate Medical Center at Syracuse is nearby and its facilities are available to graduate students from this department whose research demands the specialized library resources and sophisticated equipment provided by such a Center.

Examples of recent research areas include the ecology of small mammals in relation to forest ponds; the physiology of digestive enzymes in soil isopods and earthworms; population dynamics of fish and wildlife; marsh ecology; furbearer ecology and management; effect of pesticides on soil fauna; animal behavior; aquatic ecology; and wildlife nutrition.

## LANDSCAPE ARCHITECTURE

Albrecht, *Chairman* (Landscape Architecture); Earle (Art); Sears (Landscape Architecture); Viertel (Landscape Architecture); Williams (Recreation and Planning).

Graduate work in Landscape Architecture is offered in a variety of land planning problems. The Department's status in the College of Forestry provides unique opportunities to study problems of recreational use of public lands and forests. Fields of possible study also include regional and city planning. Usually the student is concerned with design, construction, and administration, but research and analysis can be a concentration of interest.

Based on the usual design concerns of landscape architecture, a background of association in principles of civil engineering, forestry, horticulture, and architecture is the usual prerequisite. The aim is an advanced understanding of land, its usage and development, to satisfy the requirements of beauty and efficiency. Appreciation of and familiarity with esthetic principles lie behind planning effort, and are essentials in the graduate program.

The facilities of the College as a whole, plus special drafting rooms, library collections, and technical equipment, are available. The College is well located for study work of park and recreation areas. Units under the administration of the Central New York State Parks Commission are easily accessible and the responsible coordination of the management of all resources of the forest, including timber, wildlife, watersheds, recreation, and soils.

## PULP AND PAPER TECHNOLOGY

O'Neil, *Chairman* (Pulping, Bleaching and Paper Properties) ; Dence (Organic Chemistry and Lignin Reactions) ; Gorbatsevich (Pulping, Bleaching, Paper Technology, and Paper Properties); Leopold (Organic Chemistry, and Mechanical Properties of Paper); Luner (Pulping, High-Yield Bleaching, Mechanical and Surface Properties of Paper); Marton (Paper Properties, and Pulping); Stenuf (Chemical Engineering, Instrumentation, Thermodynamics, Process Control, Metallurgy and Corrosion); Strauss (Paper Properties, Paper Coating, Pulping, and Bleaching).

The pulp and paper industry, third fastest in rate of growth among all American industries and fifth largest in the nation, needs professional men with advanced education in science and technology. The College pioneered in providing graduate study in this area in 1920, with the organization of the Department of Pulp and Paper Technology.

Since its inception, the Department has maintained a singularly high position in professional education in providing personnel for the continuing development of the pulp, paper, and allied industries. Its graduates are in constant demand throughout the world.

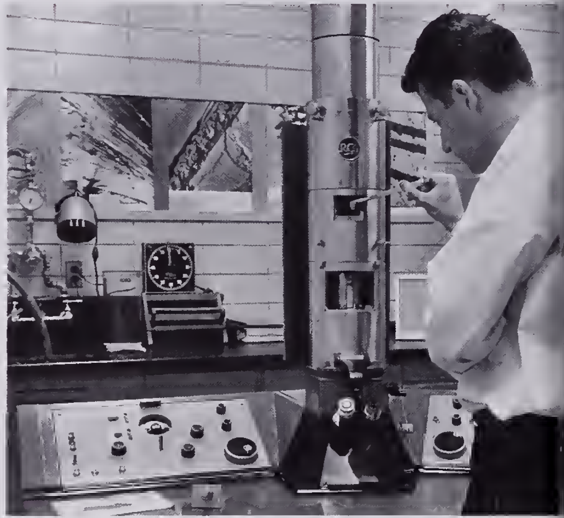
The graduate program reflects the strong trend toward diversification in the industry and offers opportunities for obtaining Master of Science and Doctor of Philosophy degrees in a variety of subjects related to the manufacture of pulp and paper. Advanced courses are offered in such diverse areas as engineering, physical and organic chemistry, polymer chemistry, paper physics, and fiber morphology.

Major research areas in the Department are: physics and chemistry of pulping and bleaching; physical properties of fibers; characteristics of the paper sheet; unit operations in the papermaking process; utilization of new raw materials; and flow properties of papermaking materials.

The research program is designed to generate new information regarding the fundamentals and the technology of the paper making processes as a contribution toward progress and future development of the industry. These efforts are made possible by the use of such advanced techniques as nuclear magnetic and electron spin resonance, nuclear tracer methods and electron microscopy, all within the framework of one of the outstanding research facilities in the field. The Department maintains an experimental pulp and paper mill equipped with machinery and instrumentation for studies in pulping, pulp purification, refining and papermaking. This facility includes a complete duplex paper machine, a 400 h.p. double disk refiner, and a two-pocket grinder for mechanical pulping.

Research activities are largely pursued in cooperation with industry. An example is the program with the Empire State Paper Research Associates, Inc., which began in 1946, and was organized as the Empire State Paper Institute (ESPRI) in 1958. The ESPRI program forms an integral part of the over-all research program of the Department.

Recent research has been directed to the fundamentals of the pulping, bleaching, and papermaking processes, to the structure of wood and wood fibers, and to the specific reactions of wood components during mechanical and chemical treatments.



### SILVICULTURE

Farnsworth, *Chairman* (Silviculture); Black (Watershed Management); Eschner (Forest Influences); Herrington (Meteorology); Leaf (Forest Soils); Stairs (Forest Genetics).

Graduate study in all aspects of silviculture, and its supporting sciences, is available. Emphasis can be placed on fundamental biological relationships or on applications of these relationships in the forest. Programs are coordinated with other areas of specialization through cooperation between the Department and other departments of the College. A major strength is in the close association of scientists representing a broad spectrum of specialists, stimulating intra- and interdisciplinary cooperation.

Graduate emphasis may be directed to silvics, silviculture, forest influences and watershed management, forest tree genetics and tree improvement, forest meteorology and climatology, forest soil physics and forest soil fertility-nutrition, and site relations. Well equipped laboratories, specialized equipment and greenhouse facilities are available to graduate students. The Department is closely allied with the State University Water Resources Center.

Extensive College forests of nearly 22,000 acres include most forest types of the northeast, as well as plantations, seed orchards, and a nursery, all of which offer exceptional opportunities for field study under a wide variety of environments. Major field installations include long-term northern hardwood cutting studies, the oldest continuously studied fertilizer trials in the U. S., and two large microclimatic tower complexes with associated automated data acquisition systems and instrumentation.

## WOOD PRODUCTS ENGINEERING

ANDERSON, *Chairman* (Wood Quality-Growth Relations); CÔTÉ (Interrelation of Wood Structure and Properties); DAVIDSON (Physical Properties of Organic Composites); DE ZEEUW (Wood Structure — Property Relations); MEYER (Wood-Polymer Systems); MOORE (Bonded Materials Technology); PENTONEY (Mechanical Behavior, and Fracture Mechanics); SKAAR (Wood Physics); G. SMITH (Marketing).

Graduate study is in wood science, wood technology, wood products engineering, and wood products distribution. The principal objectives are to develop originality and the analytical approach to problem solving. The student may emphasize appropriate phases, including the mechanical and physical properties of wood, structure and anatomy of wood, quality of wood, processing of wood into various forms and products, industrial management of wood manufacturing plants, or distribution of wood products.

Research problems are selected in consultation with the student. Typical problem areas include variations in wood structure due to ecological factors; sub-microscopic cell wall structure; preservative treatments for insect, fire, and decay resistance; protective or esthetic coatings; machining variables; adhesives and their use in assembled wood products; mechanical properties of wood including elastic and rheological properties; moisture relations and dielectric properties of wood; problems of the distribution enterprise for lumber and manufactured products.

Modern laboratories and instrumentation are available for advanced research. There is a close liaison with specialists in other disciplines concerned with wood research so that interdisciplinary approaches to problems are possible. Syracuse University course offerings are available to supplement those of the College in planning graduate study programs.

Special study and research opportunities exist with the wood-using industries. Close cooperation is maintained with these industries by the College. The large volume and variety of wood products processed within New York State creates a favorable climate for graduate study in this field.

## WORLD FORESTRY

Larson, *Director,* World Forestry Institute (Forest Administration, and World Forestry).

Graduate study and research in world forestry is a College-wide activity and as such is supported by an interdepartmental faculty representing major areas of professional specialization and varied backgrounds of foreign forestry and related experience. The non-technical elements of the program are supported in turn by a wide variety of course offerings in the Maxwell Graduate School of Citizenship and Public Affairs, the Department of Geography and other departments of Syracuse University. Opportunities for on-the-ground training and research in tropical forestry and related fields are available to qualified participants in the program under cooperative agreements maintained by the College with the University of the Andes, Merida, Venezuela, and the Institute of Tropical Forestry of the U. S. Forest Service, Rio Piedras, Puerto Rico.

Graduate study in this field is aimed at supplementing the student's technical forestry knowledge with a broad background of education deemed especially necessary for effective service in positions relating to foreign forestry. These include positions as forestry advisor, teacher and research specialist with national and international agencies, private business and industrial firms, philanthropic foundations and voluntary service organizations whose activities include the development and/or use of forest resources in other lands.

Emphasis in the program at the Master's level is on the attainment of general competence in foreign language, cultural anthropology, world geography, history and international affairs, plus a broad understanding of the world forestry situation. While the candidate is urged to devote major effort to formal course work, the preparation of a thesis is required to provide experience in critical study and original thinking. Sufficient flexibility is maintained to enable the student to focus his studies on some aspect of world forestry either global, regional or national in scope.

At the doctoral level, students are required to concentrate their studies in one of the regular disciplines or specialized areas of the College such as forest botany, forestry economics, forest management, silviculture and wood products engineering. Orientation to the world forestry field in this case is achieved in part through the selection of formal course work, but largely through providing an opportunity for the student to conduct his thesis research in residence abroad.

## ASSISTANTSHIPS, FELLOWSHIPS, AND SCHOLARSHIPS

The College awards a substantial number of assistantships, fellowships, and scholarships to qualified graduate students each year. Students may indicate their interest in a type of financial assistance on the graduate application form. College assistantships and fellowships vary in number. However, each year a substantial number of graduate students receive financial assistance. Assistantship and fellowship awards are based upon scholarship and value of services rendered to the College. Holders of assistantships and fellowships are provided working space in laboratories and other study privileges.

### College Assistantships

Assistantships are awarded students of demonstrated scholarship whose education and experience enables them to assist in laboratory instruction and research at the College. Such service is limited to 15 hours per week. Stipends vary in amount beginning at about $2500 for the academic year (two semesters). A portion of the stipend is classified as a fellowship grant. Students on assistantships are permitted to carry 12 hours of course work per semester. Tuition is waived for holders of assistantships, and the student is only required to pay $50 per semester in fees and assessments.

### Special Fellowships and Assistantships

Fellowships and assistantships sponsored by industries, associations, and foundations are available in several departments. While the amount of stipends vary, they begin at about $2500 a year. Holders of these special fellowships and assistantships are required to confine the major part of their research activities to definitely specified fields. Tuition is either waived or provided by sponsors, and the student is only required to pay $50 per semester in fees and assessments.

### National Science Foundation Fellowships

The National Science Foundation cooperates with the College in awarding Graduate Traineeships to a number of graduate students each year. Stipends range from $2400 to $2800 for a 12-month period, with an additional $500 provided for each dependent. Tuition and fees are paid by the College.

### National Defense Education Fellowships

Graduate fellowships are currently available under Title IV of the National Defense Education Act in the Departments of Forest Chemistry, Forest Entomology, Forest Botany and Pathology, Forest Zoology, Silviculture, Wood Products Engineering, and Pulp and Paper Technology. Stipends begin at $2000 for a 9-month period and $2400 for a 12-month period. An additional allowance is available for dependents. Fellowship tenure is for 3 years with the stipend increasing $200 each year. These fellowships are limited to doctoral students. Tuition and fees are paid by the College. Support for these fellowships comes from the Office of Education of the United States Department of Health, Education, and Welfare.

### Tuition Waiver Scholarships

Tuition waivers may be awarded to a limited number of foreign students judged to possess special academic capabilities and with demonstrated financial need. Tuition waivers also are made available on a reciprocal basis to selected foreign students in special cooperative programs maintained between certain foreign institutions and the College's World Forestry Institute. The student does not receive any actual cash payment, but the tuition charge is waived. Such students are required to pay $50 per semester in fees and assessments. Requests for such tuition waivers may be made on the graduate application form.

### LOANS

Graduate students may be eligible for various types of educational loans. Detailed information about loan programs is given in the undergraduate section on Financial Aids and Awards.

### OTHER FORMS OF SELF-SUPPORT

Graduate students without assistantships or fellowships may be employed at an hourly rate to assist in laboratories and other College activities. Such hourly employment does not include free tuition.

Employment also may be sought on a part-time basis through the Student Services office of the College or the Syracuse University Placement Office.

### REQUIREMENTS FOR DEGREES

The College confers the degrees of Master of Science, Master of Forestry, Master of Landscape Architecture, and Doctor of Philosophy upon students who qualify by completing specified requirements of study, research, and residence.

Graduate programs are flexible and developed individually. Each program is planned by the major professor with the student to meet his particular academic needs. Sometimes this includes undergraduate courses for which no graduate credit can be given. In every case emphasis is placed on outlining a study program leading to a high level of scholarly achievement.

An entire program for each student is usually planned during the first two weeks of the academic year. It must be approved by the major professor, department chairman, and Director of Graduate Studies. The program is modified as required upon recommendation of the major professor and with approval of the Director of Graduate Studies. A thesis committee consisting of the major professor and several other faculty members is appointed early in each student's study program.

All programs leading to the Master of Science, Master of Forestry, and Master of Landscape Architecture degrees require at least 30 semester hours of graduate credit. Normally, graduate-level course work (passed with an average grade of at least B) takes up 12 to 24 hours. The remaining credit-hour requirement is met by submitting a thesis presenting the results of original research. Acceptance of the thesis depends on clear demonstration of ability to search and evaluate pertinent literature independently, to plan and carry through independent investigation, to interpret the significance of findings, and to present the subject in a well-organized, lucid, and scholarly report. The student must pass a final oral examination in which he defends his thesis and demonstrates his knowledge of related subject areas.

Candidates for Master's degrees must spend at least two semesters in residence at the College of Forestry.

The Doctor of Philosophy degree is conferred on students who have completed a minimum of 90 semester hours of graduate level credit with an average grade of at least B. A student holding a Master's degree may be allowed up to 30 hours of credit toward the 90 required for the doctorate. The doctoral thesis is evaluated at between 30 and 45 hours of graduate credit. The student must pass a comprehensive examination covering his field in depth and, in a somewhat broader manner, allied fields, before being admitted to candidacy for the doctorate. He must also pass a final oral examination in defense of his thesis and also covering his major and minor fields of study.

In addition, the student must demonstrate a reading knowledge of one foreign language in which pertinent literature in his subject area appears. Some departments require a second foreign language or demonstrated knowledge of statistics or computer analysis where these are important in the field of study. The Director of Graduate Studies or the departmental chairman will provide information on such additional special requirements. Courses taken to acquire a reading knowledge of a language may not be accepted for graduate credit.

A candidate for the Ph.D. degree with only a Bachelor degree must be in residence for at least two full academic years. A candidate having a Master's degree must be in residence for at least one full academic year.

The requirements outlined govern the minimal amount of work to be done. Quality of work is especially emphasized for the Doctor of Philosophy degree. The student is required to penetrate the frontier of knowledge in his particular field and make a definite contribution to this knowledge. He is required to demonstrate original scholarship of a high order in his search and evaluation of literature, in the planning, execution, and interpretation of his own research, and in the presentation of his findings in a thesis. Subsequent publication in a scholarly journal is encouraged.

## ADMISSION REQUIREMENTS

Admittance to graduate study will be granted only to applicants with at least a Bachelor's degree from a recognized institution, whose preparation has been suitable in quality and content for the proposed field of major study. Applicants will be evaluated on the basis of the following: (1) their academic record should show approximately a "B" or 80% average for the Junior and Senior years; (2) Graduate Record Examination Aptitude scores and in some cases, subject matter tests indicative of graduate study ability; (3) supporting letters of recommendation, and (4) where appropriate other evidences of scholarly achievement and potential. Priority in admission is given applicants who have high scholastic standing.

All applicants are required to submit Graduate Record Examination aptitude scores and subject matter (advanced) test scores when applicable in their subject area with their graduate application. This examination is offered several times per year in major cities of the world. For information on registration and scheduling write to the Educational Testing Service, Princeton, New Jersey 08540. In submitting test scores request that they be sent to the Director of Graduate Studies, State University College of Forestry, Syracuse, New York (Institutional number 2530).

The College provides a special form for application for graduate work. Requests for information and applications should be addressed to the Director of Graduate Studies, State University College of Forestry, Syracuse, New York 13210.

Under special conditions and on recommendation of the department chairman concerned, students may be admitted at the discretion of the Graduate Committee and carried on a non-degree status. Non-degree students accepted for special study programs may be regarded as visitors and normal graduate standards need not apply.

### INTERNATIONAL STUDENTS

Traditionally the educational needs in forestry, forest products, and their supporting science disciplines have been recognized on a world-wide basis at the College of Forestry. Recently a World Forestry Institute was developed to pay special attention to various world forestry problems. Citizens of other countries with special educational objectives are welcome and will be accepted for graduate study under special conditions. They must show satisfactory evidence that they have completed studies in their major field equivalent to those at a recognized American institution with a scholastic record equivalent to a B average in their Junior and Senior years. They must submit Graduate Record Examination scores as explained in the section on Admission Requirements. Also, applicants whose native language is other than English must submit scores on the Test of English as a Foreign Language (TOEFL) as an indication of their ability with the English language. This examination is offered several times per year in major cities of the world. For information on registration and scheduling write to the Educational Testing Service, Princeton, New Jersey 08540, U.S.A. In submitting test scores request that they be sent to the Director of Graduate Studies, State University College of Forestry, Syracuse, New York. See the section on scholarships for information on tuition waivers in special cases for foreign students.

## ACADEMIC REQUIREMENTS

Graduate students are required to maintain a B average as a minimum. Students whose cumulative grade point average falls below "B" at the end of any semester are placed on probation for the following semester. A student placed on probational status must qualify for full standing by the end of that semester or be subject to dismissal from graduate study.

## TUITION FEES AND EXPENSES

### *Paid Every Semester**

*Total fees and assessment to students who have been granted a tuition waiver: $50.00 per semester.

| | |
|---|---|
| Tuition | $300.00 |
| Fees | 17.50 |

### *Paid Once*

| | |
|---|---|
| Commencement fee (this fee includes the cost of binding the four required copies of the thesis. This fee must be paid before graduation) | $25.00 |

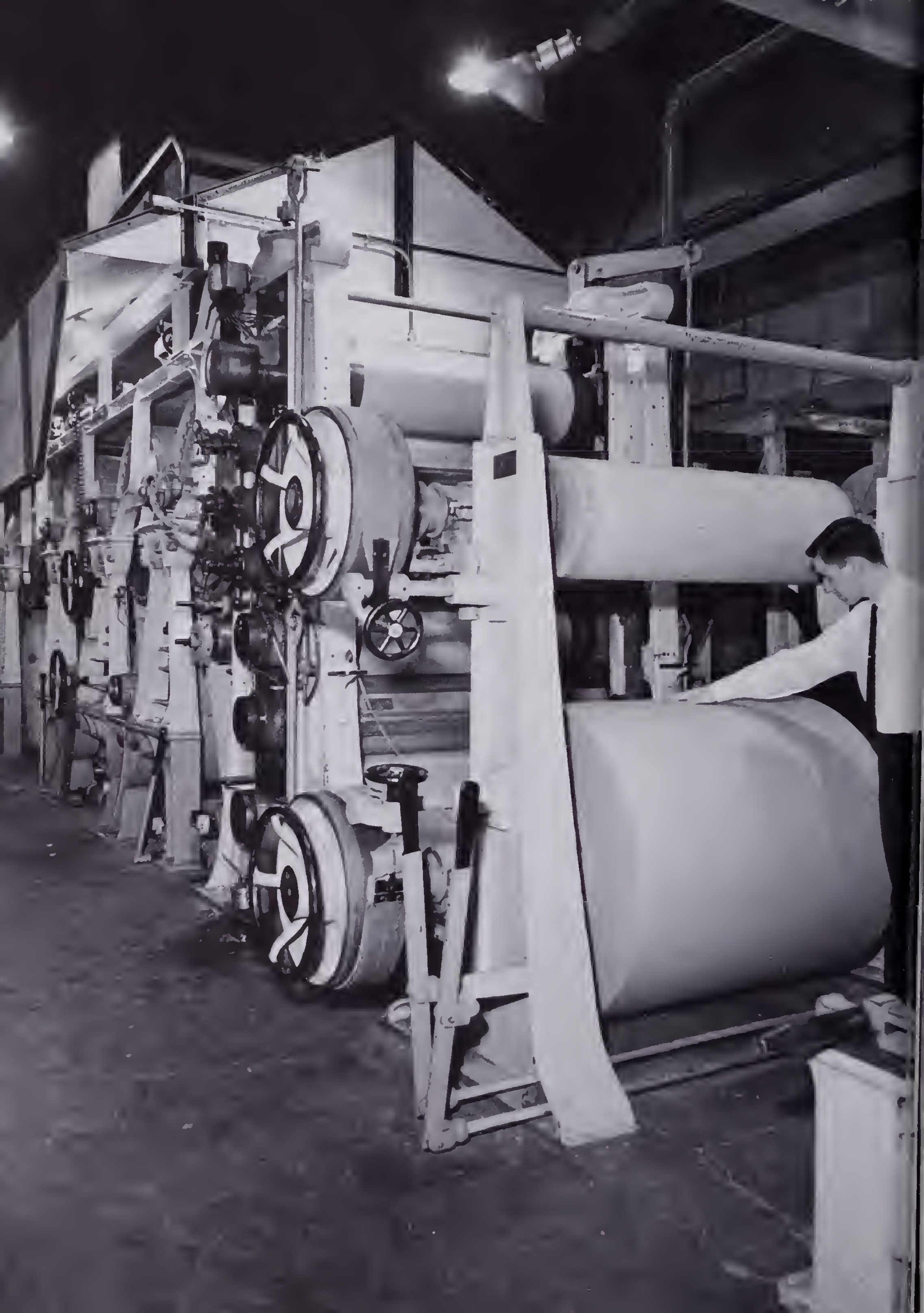
Qualified New York State residents are eligible for Scholar Incentive Program grants and State University Grants-in-Aid which vary with the net taxable family income of students and the level of study, and provide substantial reductions in tuition. For details, contact the Financial Aids Officer at the College of Forestry.

International students and graduate students in the Physical Science Division are required as part of registration to take out a Student's Accident and Sickness Insurance Policy or its equivalent. Fellowship recipients and employees of the State University Research Foundation also are required to take the health and accident insurance available through the Foundation.

Living expenses are subject to considerable variation. Many graduate students live in private homes where prices range from $8-12 per week for a single room, and from $10-15 per week or more for double room. Students are eligible to purchase meal tickets from Syracuse University (currently $17.75 per week, $519.75 per year, 34 weeks). This ticket pays for all meals except Sunday night supper. Expenses for textbooks and supplies average $100 or more a year. Personal expenses vary depending on needs and tastes.

## HOUSING

The College of Forestry operates no dormitories or student residences. These are facilities of Syracuse University. Married students are certified to the Syracuse University Married Students' Housing Office, through which the University operates rental dwelling units for families with and without children. Veterans of the Armed Forces of the United States and her allies are given priority. Married students who wish to live in University housing should write to the Director, Married Student Housing, 1528 East Colvin Street, Syracuse, New York 13210.



# VII

# COURSE OFFERINGS

The academic resources of three institutions — the State University College of Forestry, Syracuse University, and the State University Upstate Medical Center — are available to undergraduates and graduate students in developing their study programs at the College.

In addition to the many professional and basic science courses offered by the College, a wide range of offerings are taken either as required courses or are available as electives at adjacent Syracuse University. The required courses are in certain subject areas of chemistry, physics, mathematics, geology, English, business law, personnel relations, and public address. The elective courses include most academic offerings of Syracuse University and representative subject areas are the humanities, social sciences, life sciences, physical sciences, engineering, mathematics, and the arts.

In graduate programs at the College, Syracuse University courses are used extensively in the fields of mathematics, physics, chemistry, biology, engineering, economics, business, and citizenship. The State University Upstate Medical Center has courses available for graduate programs in the areas of anatomy, biochemistry, cytology, microbiology, and physiology.

## DESCRIPTION OF COLLEGE OF FORESTRY COURSES

The courses offered by the College are grouped by general subject areas, and the number of credit hours appears after the course title. A credit hour means one recitation (or lecture) hour per week. Three laboratory hours are equivalent to one lecture hour. The Roman numeral following the description indicates the semester in which the course is given.

Courses numbered 1 to 99 are for undergraduates only. Courses numbered 100 to 199 are for graduates and undergraduates. Courses numbered 200 to 299 are exclusively for graduate students.

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## APPLIED MATHEMATICS

### 100. ELEMENTARY PROBABILITY AND STATISTICS

*Credit 3 hours*

Two hours lecture, three hours laboratory.

Introduction to probability and modern statistical methods; interpretation of statistical measures as a scientific tool. — I and II. Mr. Bickford and Staff.

*Prerequisite*: Junior standing.

### 110. STATISTICAL THEORY

*Credit 3 hours*

Two hours lecture, three hours laboratory.

Bases for application of standards of accuracy and statistical methods in forest science and technology: elementary probability in relation to the distribution of random errors and the measurement and control of these errors. — I. Mr. Bickford and Staff.

*Prerequisite*: Differential and integral calculus.

### 150. INTRODUCTION TO COMPUTER PROGRAMMING

*Credit 3 hours*

Principles of communication with electronic digital computer systems by means of the Fortran language. The presentation of the course pre-supposes a background and maturity in the logic of the scientific method. Actual practice is achieved by programming and running problems on the College Computer Center equipment. — I. Also offered second semester 1966-67. Mr. Lee and Staff.

*Prerequisite*: Junior or higher standing.

### 199. STATISTICAL ANALYSIS

*Credit 3 hours*

Two hours lecture, three hours laboratory.

A treatment of statistical inference, including paired design, group design, linear regression and correlation, one-way analysis of variance, and some application of chi-square. Calculation of statistics, tests of hypotheses, and proper interpretation of calculated statistics. — I and II. Mr. Bickford and Staff.

200. ANALYSIS OF VARIANCE

*Credit 3 hours*

Two hours of lecture and recitation, three hours of laboratory. Multi-way classifications in the analysis of variance, with emphasis on the development of models, including randomized blocks, latin squares, split plots, and factorial designs with fixed effects, random effects, and mixed effects; multiple and partial regression and correlation (including curvilinear), using matrix methods; analysis of co-variance, distribution free methods, and sequential testing. — II. Mr. Bickford and Staff.

*Prerequisites*: A M 199 or A M 110, or equivalent. Open only to graduate students (and qualified seniors with consent of instructor).

210. COMPUTER CONCEPTS

*Credit 3 hours*

Fundamental concepts of computer design and applications. Emphasis is placed on general principles to provide a basis for creative computer applications. — II. Mr. Lee and Staff.

*Prerequisites*: Applied Mathematics 150 or equivalent; permission of instructor.

## BIOLOGY (FOREST BIOLOGY)

1. FIELD BIOLOGY

*Credit 1 Hour*

*Summer Session in Field Forestry*

One week of field work

Major plant and animal species of the forest community and their dynamic interrelationships with the environment.— Mr. Ketchledge and Staff.

100. PRINCIPLES OF GENERAL PHYSIOLOGY

*Credit 3 hours*

Three hours of lectures. Introduction to the dynamics of living systems with emphasis on the universality of the biological world. — I. Mr. Brezner.

*Prerequisite*: One semester of organic chemistry.

110. GENERAL ECOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments, ecological factors, energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography, and representative ecosystems. — I. Mr. Alexander.

*Prerequisite*: A year course in biology or equivalent.

199. RESEARCH PROBLEM IN BIOLOGY

*Credit 1-3 hours, either semester*

Independent research in topics in Forest Biology for the superior undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions, and critiques scheduled as necessary. Final written report required for departmental record. — I or II. Staff.

*Prerequisite*: Consent of instructor.

200. BIOLOGY SEMINAR

*Credit 1 hour*

One hour of lecture discussion per week. The course emphasizes current concepts and developments in biology. — I and/or II. Mr. Zabel and Staff.

## BOTANY (FOREST BOTANY AND PATHOLOGY)

MR. TEPPER, *Chairman*. MESSRS. KETCHLEDGE, LOWE, McDOWELL, MORRISON, SCHAEDLE, SILVERBORG, VALENTINE, WILCOX, ZABEL, MRS. WANG.

### 1. FOREST BOTANY

*Credit 4 hours*

Prerequisite to all other courses in Forest Botany. Three hours of lecture, three hours of laboratory. Introductory study of the morphology, anatomy, physiology and reproduction of seed plants. — I. Mr. Morrison, Mrs. Wang and Staff.

### 2a. DENDROLOGY

*Credit 2 hours*

One hour lecture and one three-hour laboratory/field trip each week. Field study, identification, taxonomy, and elementary silvics of important forest trees of North America. — I. Mr. Ketchledge and Staff.

### 2b. DENDROLOGY

*Credit 1 hour*

One three-hour laboratory/field trip each week. A continuation of the first semester with special emphasis on species native to Northeastern North America or of major economic or world-wide importance. — II. Mr. Ketchledge.

### 3. CLASSIFICATION OF THE PLANT KINGDOM

*Credit 3 hours*

Two hours of lecture and three hours of laboratory. Introductory study of the Plant Kingdom with emphasis on the angiosperms. — II. Mr. Morrison, Mrs. Wang and Staff.

### 40. FOREST PATHOLOGY

*Credit 3 hours*

Two lecture hours and three hours of laboratory. Major diseases of forest trees with special emphasis on their identification and control. — I. Mr. Silverborg.

*Prerequisite*: Plant Physiology.

### 103. PLANT PHYSIOLOGY

*Credit 2 hours*

Two hours of lectures. Descriptive aspects of the fundamental activities of plants. Subjects to be covered include cell structure, water and mineral metabolism, organic nutrition and a brief introduction to biological control mechanisms. Not open to biology majors. — I. Mr. Schaedle.

*Prerequisite*: F. Botany 1 or equivalent.

### 105. FUNDAMENTALS OF GENETICS

*Credit 4 hours*

Three hours of lecture, three hours of laboratory. A general course in genetics. Breeding experiments with animals and plants are used to demonstrate the principles of heredity. The application and role of genetics in research is stressed. — I. Mr. Valentine.

*Prerequisites*: F Bot 1, F Zoo 1 or equivalent courses.

### 110. PLANT PHYSIOLOGY

*Credit 2 hours*

Two hours of lecture. Internal processes and conditions in higher plants with emphasis on physiological and biochemical concepts. For students majoring in the biological sciences — II. Mr. Wilcox.

*Prerequisite*: F Biology 100.

### 111. PLANT PHYSIOLOGY LABORATORY

*Credit 2 hours*

Two laboratory sessions. Introduction to current methods and procedures of physiological research including nutrition, tissue culture, photosynthesis respiration, and hormonal regulation of growth. Mr. Wilcox and Mr. Schaedle.

*Prerequisites*: Forest Biology 100, corequisite Forest Botany 110, or permission of the instructor. Advance tentative registration with the instructor is required.

### 120. SYSTEMATIC BOTANY

*Credit 2 or 3 hours*

Two hours of lecture, three hours of laboratory. Identification, nomenclature and classification of flowering plants with special emphasis on local flora and on developing the ability to classify the plants of any region. — II. Mr. Morrison.

*Prerequisite*: F Bot 3 or permission of the instructor.

### 130. FOREST ECOLOGY

*Credit 3 hours*

Two hours of lecture/discussion; one laboratory/field trip; one weekend field trip. An advanced course stressing current research in forest dynamics, vegetational development, ecological methods, and phytosociology.— II.

*Prerequisites*: F Bot 2; F Biol 110 or Silvi 101.

### 140. PHYTOPATHOLOGICAL METHODS

*Credit 3 hours*

A series of laboratory problems involving isolation, culture, and identification of fungi and experimental studies on their pathological activities. A research problem with final report also required of each student. — II.

*Prerequisite*: F Bot 40 or 141.

### 141. WOOD DETERIORATION BY MICROORGANISMS

*Credit 3 hours*

Two hours of lecture, three hours of laboratory/field trip. Major types of fungus defects of wood and its products and principles of control. Special emphasis on physiology of microorganisms, chemistry of wood decay, wood durability, toxicants, lumber discolorations, heartrot, decay in forest products, slime problems in pulp and paper mills, and water pollution. — I. Mr. Zabel.

*Prerequisite*: Organic chemistry. Course offered in even calendar years.

### 142. SHADE TREE PATHOLOGY

*Credit 2 hours*

One hour of lecture, three hours of laboratory/field trip. Common diseases of shade trees and ornamental shrubs are stressed. Emphasis is placed on environment in relation to disease. Modern methods of tree care and disease prevention and control are presented. — I. Mr. Silverborg.

*Prerequisites*: F Bot 1, Plant Physiology. Course offered in odd calendar years.

### 150. MYCOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Comprehensive survey of the morphology, taxonomy, and activities of fungi. Laboratory experience in isolation and identification of fungi and experimental work with fungi in pure culture. — I.

*Prerequisite*: F Bot 3.

### 160. PLANT ANATOMY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. An introductory course in plant anatomy designed to familiarize the student with the organization and development of the primary and secondary plant body of higher plants. — II. Mr. Tepper.

*Prerequisite*: F Bot 1.

### 170. PRINCIPLES OF PHYTOPATHOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. The major principles involved in plant diseases and their control — I. Mr. McDowell.

*Prerequisites*: F Bot 140, F Bot 110, F Bot 150, and Genetics, or permission of the instructor. Course offered in odd calendar years.

### 200. FOREST BOTANY SEMINAR

*Credit 1 hour each semester*

Assigned reports and round-table discussion of current topics in plant science. — I and II. Staff.

### 201. RESEARCH IN FOREST BOTANY

*Credit hours arranged according to nature of problem*

Advanced study and research problems in forest pathology, wood deterioration, tree physiology, anatomy, mycology, ecology, taxonomy, and genetics. Typewritten report required. — I and II. Staff.

### 205. ADVANCED GENETICS

*Credit 2 hours*

Two hours of lecture and discussion. Advanced study of fundamental genetics. Emphasis is on concepts of the gene, its action, and function.— II. Mr. Valentine.

*Prerequisites*: F Bot 105, Silvi 107, and elementary cytology, or consent of instructor.

### 210a and b. PLANT GROWTH AND DEVELOPMENT

*Credit 3 hours each semester*

Two hours lecture and one three-hour laboratory. A study of the growth and development of plants and the physiological and biochemical processes that influence the development of form and structure in the higher plants. Begins in even years. — I and II. Messrs. Wilcox and Tepper.

*Prerequisites:* F Bot 110 and 160 or permission of the instructor.

### 211. TRANSPORT PHENOMENA AND NUTRITION

*Credit 3 hours*

Two hours of lecture and one hour of discussion. Transport phenomena in living systems, membrane function, physiological aspects of cell and tissue compartmentalization, mineral and organic nutrition of plants. — II. Mr. Schaedle.

*Prerequisites:* F Bot 110 or equivalent, one semester of Biochemistry or permission of the instructor.

### 215. ADVANCED FOREST PATHOLOGY

*Credit 2 hours*

Lecture, discussion, and field trips. Hours to be arranged. Advanced studies in forest pathology and wood deterioration with emphasis on current topics in the literature. Course offered in odd calendar years. — II. Mr. Silverborg.

*Prerequisite*: F Bot 40 or 141.

### 220. ADVANCED SYSTEMATIC BOTANY

*Credit 2 or 3 hours*

Lectures and laboratory. Field trips. Advanced study in the identification, nomenclature, and classification of flowering plants. Special emphasis on Gymnospermae, Compositae and Gramineae. — I. Mr. Morrison.

*Prerequisite*: F Bot 120 or equivalent.

### 225. THESIS

Credit hours to be arranged. — I and II. Staff.

### 250. ADVANCED MYCOLOGY, HOMOBASIDIOMYCETES

*Credit 3 hours*

Review of selected literature as well as laboratory training in identification and research techniques. — I.

*Prerequisite*: F Bot 150. Course offered in odd calendar years.

### 251. ADVANCED MYCOLOGY, HETEROBASIDIOMYCETES

*Credit 3 hours*

Review of selected literature as well as laboratory training in identification and research techniques.— II.

*Prerequisite*: F Bot 150. Course offered in even calendar years.

252. ADVANCED MYCOLOGY, ASCOMYCETES

*Credit 3 hours*

Review of selected literature as well as laboratory training in identification and research techniques. — I.

*Prerequisite*: F Bot 150. Course offered in even calendar years.

253. ADVANCED MYCOLOGY, MYXOMYCETES, PHYCOMYCETES, FUNGI IMPERFECTI

*Credit 3 hours*

Review of selected literature as well as laboratory training in identification and research techniques. — II.

*Prerequisite:* F Bot 150. Course offered in odd calendar years.

## CHEMISTRY (FOREST CHEMISTRY)

Mr. Schuerch, *Chairman.* Messrs. Baum, Jagur, Jahn, LaLonde, Marchessault, Meyer, Smid, Sondheimer, Szwarc, Timell, Walton, Mrs. Jennison.

20. ORGANIC CHEMISTRY

*Credit 3 hours each semester*

Three hours of lecture. Elementary chemistry of aliphatic and aromatic compounds with special emphasis on carbohydrates. Nomenclature of simple compounds and reactions of common functional groups. Modern theoretical concepts. — I and II. Mr. LaLonde.

*Prerequisite*: Chem 6.

21. ORGANIC CHEMISTRY LABORATORY

*Credit 1 hour each semester*

One three hour laboratory period. Laboratory techniques in Organic Chemistry, organic syntheses, identification and characterization of organic compounds, including modern analytical methods. — I and II. Mr. Baum.

*Prerequisite*: Chem 6.

109. INTRODUCTION TO RESEARCH

*Credit 1 hour first semester,*
*6 hours second semester*

First semester: Introduction to chemical literature. Problems in the use of Beilstein. Problems in structure proof by spectrophotometric and chemical methods. Development of work plan in the chemistry of wood, polymers or plant extractives, or in biochemistry. Typewritten report including statement of problem, literature survey and work plan.

Second semester: Directed laboratory research with special laboratory techniques. Typewritten report on data, procedures, results and conclusions. — I and II. Mr. Schuerch and Staff.

114. UNDERGRADUATE SEMINAR

*Credit 1 hour*

Literature surveys and seminars on topics of current research interest and recent advances in Chemistry. — II. Mr. Walton.

121. INTRODUCTION TO POLYMER CHEMISTRY

*Credit 3 hours first semester*

Three hours of lecture. Mechanism and kinetics of condensation and addition polymerization; stereochemistry of macromolecules; chain statistics and polymer solution theory; molecular weight determination and hydrodynamic properties; polyphase structure of natural and synthetic polymers. — I. Mr. Smid.

*Prerequisites*: FC 20, Chem 140.

122. POLYMER PROPERTIES AND PROCESSING

*Credit 3 hours second semester*

Three hours of lecture. Polymer types: chemical and physical classification, physical and mechanical properties, relation to end use. Manufacturing and fabricating processes for fibers, films, and plastics. Local field trips. — II. Mr. Marchessault.

*Prerequisites*: FC 20, Chem 140.

### 124. POLYMER TECHNIQUES

*Credit 2 hours*

One hour lecture-discussion and three hours of laboratory; laboratory reports. Techniques of polymer preparation: free radical in solution, emulsion, catalytic and radiation polymerizations. Physical characterization: polarized microscopy, light scattering, ultracentrifugation, viscosity. Rubber elasticity: modulus determination, molecular weight between crosslinks swelling equilibrium. — I. Mr. Marchessault.

*Prerequisites:* FC 20, Chem 140, concurrent FC 121.

### 125. CHEMISTRY OF CELLULOSE AND WOOD

*Credit 3 hours each semester*

First semester: introduction to carbohydrate chemistry. Structure and properties of cellulose and celluose derivatives, hemicelluloses, pectin, starch, and lignin. Chemistry of wood extractives. Three lectures.

Second semester: Biosynthesis of wood components. Hemicelluloses and methods used in their investigation. Chemistry of the wood pulping and bleaching processes. The chemistry of bark. Anatomy, ultrastructure, and chemistry of the woody plant cell wall. Reaction wood. Biochemical evolution of trees. Three lectures. — I and II. Mr. Timell.

*Prerequisite*: FC 20 or equivalent.

### 126. CELLULOSE AND WOOD CHEMISTRY LABORATORY

*Credit 2 hours*

Six hours of laboratory. Wood analyses. Isolation and characterization of wood components. Preparation of cellulose derivatives. Modern chromatographic techniques for separation and analysis of wood constituents. Polarimetry. One laboratory period. — I. Mr. Timell.

*Prerequisite:* FC 20; concurrent: FC 125a.

### 130. BIOCHEMISTRY

*Credit 3 hours each semester*

First semester, three hours of lecture. General biochemistry with emphasis on cellular constituents and metabolic reactions. The chemical, physical and biological properties of amino acids, proteins, carbohydrates — and their intermediary metabolism will be discussed. The chemistry of enzymes, energy transfers and biological oxidations will also be covered.

Second semester, three hours of lecture. Topics discussed are: application of tracer techniques to biochemistry, the chemical and bio-chemical properties of lipids, theories on the origin of life, photosynthesis and the biosynthesis of steroids and terpenes, plant aromatics, amino acids, porphyrins and other aspects of nitrogen metabolism. Selected aspects of plant hormones and plant diseases are also included. — I and II. Mr. Sondheimer.

*Prerequisite*: FC 20 or equivalent and Chem 140a and Chem 140b as a pre- or co-requisite.

### 131. BIOCHEMISTRY LABORATORY

*Credit 2 hours*

One hour lecture and discussion, three hours laboratory. This course will stress techniques used in biochemical research. Techniques used include various types of chromatography, electrophoresis, and spectrophotometry, and methods involved in the isolation, purification and assay of enzymes. — I. Mr. Walton.

*Prerequisite:* Chem 130. Co-requisite FC 130a.

### 140. NUCLEAR CHEMICAL TECHNIQUES

*Credit 3 hours*

One hour lecture and two three-hour laboratory periods each week. Laboratory techniques and practices will be stressed. Experience with modern radioisotope counting techniques is offered with such instruments as Geiger-Muller, proportional, and scintillation counters, the use of the gamma spectrometer, the beta liquid scintillation spectrometer, and the vibrating-reed electrometer. The high energy gamma radiation from the Cobalt-60 source is also used for polymerization and biological experiments. Experience with the fast neutron generator in activation analysis is also available. — II. Mr. Meyer.

*Prerequisites*: Physical, organic and inorganic chemistry, or permission of instructor; Chemistry 121 is strongly recommended. Advance tentative registration with instructor is required.

### 201. RESEARCH IN CHEMISTRY

*Credit hours arranged according to nature of problem*

Problems in the physical and organic chemistry of synthetic polymers and in the physical, organic, and biochemistry of polymeric wood components and natural products are assigned. One typewritten report (original and three carbons) required. — I and II. Staff.

*Prerequisites* depend upon the problem.

### 202. SPECIAL TOPICS IN CHEMISTRY

*Credit 1 to 3 hours arranged according to nature of topics*

Lectures, conferences, and discussion. Advanced topics in physical chemistry, organic chemistry, or biochemistry or in the chemistry of cellulose, wood or polymers. — I and II. Staff.

### 203. SEMINAR

*Credit 1 hour each semester*

Discussion of recent advances in chemistry. — I and II. Messrs. Baum and Szwarc.

### 222. WOOD EXTRACTIVES

*Credit 3 hours*

Three hours of lecture and discussion. Chemistry of extraneous components of wood with acyclic, alicyclic and aromatic structures. Emphasis on proof of structure and synthesis of mono-, sesqui-, and diterpenoids. Structure proof involves both chemical and spectroscopic techniques. Related problems in rearrangements, stereochemistry and conformational analysis are discussed. — I. Mr. LaLonde.

*Prerequisite*: Chem 250.

### 225. THESIS

*Credit hours to be arranged*

I and II. Staff.

### 230. TOPICS IN PLANT BIOCHEMISTRY

*Credit 3 hours*

Three hours lecture and discussion. Covers topics in biochemistry unique to plants, including photosynthesis, biosynthesis of cell-wall components, phenolics, terpenes, nitrogen metabolism, structure and function of plant hormones, biochemistry of differentiation and growth regulatory mechanisms. — I. Mr. Walton.

*Prerequisites*: FC 130a, b, or equivalents.

### 242. ORGANIC CHEMISTRY OF POLYMERS

*Credit 3 hours*

Three hours of lecture, discussion and recitation. A broad survey of polymer forming reactions and polymeric structures. Some relations between molecular structure and useful properties. Special problems in stereochemistry and polymerization mechanisms. — II. Mr. Schuerch.

*Prerequisites*: FC 20, 121.

### 243. PHYSICAL CHEMISTRY OF POLYMERS

*Credit 3 hours*

Three hours of lecture and discussion. Statistics of chain configurations. Thermodynamics of polymer solutions: solubility behavior, fractional precipitation, molecular weights, cross-linking and swelling. Kinetic theory of rubber elasticity. Birefrigence of rubber-like networks. The crystalline state. — II. Mr. Marchessault.

*Prerequisites*: FC 121, Chem 240.

## ECONOMICS (FORESTRY ECONOMICS)

Mr. Duerr, *Chairman.* Messrs. Armstrong, Bennett, Christiansen, C. Miller.

### 1. INTRODUCTION TO ECONOMICS FOR FORESTRY

*Credit 3 hours*

Three hours of lecture and discussion. Population and resources. Trends in the American economy. Supply and demand. Theory of the firm and industry. Composition, measurement, and determination of national income. Monetary and fiscal policies. The roles of government, business and labor. Comparative economic systems. General economic principles are stressed. — I. Mr. Bennett.

### 2. INTRODUCTION TO MACRO-ECONOMICS

*Credit 3 hours*

Three hours of lecture and discussion. Composition, measurement, and determination of national income. Business cycles in the American economy. Financial institutions of the United States. Monetary and fiscal policies. The Theory of Economic Growth and problems in attaining adequate levels of economic growth. — II.

### 3. INTRODUCTION TO MICRO-ECONOMICS

*Credit 3 hours*

Three hours of lecture and discussion. Pricing and Resource Allocation. Supply and Demand. Theory of the firm and industry. The role of labor unions in the American Economy. Problems in anti-trust policy. The Theory of International Trade. — I.

### 101. PRINCIPLES OF FORESTRY ECONOMICS

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Economics of the production of forest goods and services. Land, labor and capital and their combination in forest production. Supply and demand of various forest products and their changes over time. Economics of taxation and public policy formation. Emphasis is placed upon principles and methods of analysis useful in understanding and in making resource management decisions. — I. Mr. Christiansen.

*Prerequisite*: FE 3 or equivalent.

### 111. ECONOMICS OF THE FOREST BUSINESS

Two hours of lecture, three hours of laboratory. Lectures are devoted to some of the operational methods for decision-making on forest properties under conditions of certainty and uncertainty. In the laboratory, students apply the methods, making some use of the computer. Students are encouraged to develop their own applications in areas of their special interest. — II. Mr. Christiansen.

*Prerequisite*: FE 101 or permission of the instructor.

### 131. ECONOMICS OF WOOD-USING INDUSTRIES

*Credit 3 hours*

Three hours of lecture and discussion. Structure and organization of selected wood-using industries. Analysis of decision-making by the firm. Principles of production and marketing including demand and cost analysis and pricing. Special issues and current problems of the industries, and introduction to the newer mathematical and statistical tools for meeting them. — II. Mr. Armstrong.

*Prerequisite*: FE 1 or equivalent.

200. SEMINAR

*Credit 1 to 3 hours each semester*

Group discussion and individual conference. Critical examination of economic ideas and policies in forestry. Topics of interest to the group are selected for study, such as current developments in analytical method or in economy policy, the economic problems of small business in forestry, national or world requirements for the goods and services of the forest, or the economy of a forest region. Primarily for graduate students in forestry economics and world forestry. — I and II. Mr. Duerr.

201. PROBLEMS IN THE ECONOMICS OF FORESTRY

*Credit hours to be arranged*

Study of a topic in forestry economics, with emphasis on wide reading, original thinking, and analytical writing. — I and II. Staff.

202. ADVANCED PRINCIPLES OF FORESTRY ECONOMICS I

*Credit 3 hours*

Two hours of lecture, two hours of discussion. Intensive study of the micro-economics of forestry. Offered only to graduate students. — I. Mr. Duerr.

203. ADVANCED PRINCIPLES OF FORESTRY ECONOMICS II

*Credit 3 hours*

Two hours of lecture, two hours of discussion. Intensive study of the macro-economics of forestry. Offered only to graduate students. — I. Mr. Duerr.

208. HISTORY OF ECONOMIC THOUGHT IN FORESTRY

*Credit 3 hours*

Three hours of discussion or conference. Systematic study and critique of the development of the thinking of foresters and economists with respect to some segment of the subject matter of forestry economics. Review of major individual contributions to thought and the influence of leading scholars upon the thinking of others. Appraisal of the leading schools of thought. Offered only to graduate students. — I or II. Mr. Bennett.

221. RESEARCH METHODS

*Credit 3 hours*

Three hours of discussion or conference. Study of the standard techniques for developing and testing hypotheses in social science. Analysis and critique of completed research.

225. THESIS

Credit hours to be arranged. — I and II. Staff.

## ENGINEERING (FOREST ENGINEERING)

Mr. Getty, *Chairman.* Messrs. Bickford, Brock, Burch, Echelberger, Graves, Horn, Kasile, Koten, LaPage, Lee, Palmer, Shafer, Tully, Wenger, Whittaker, Lanckton.

101. PLANE AND GEODETIC SURVEYING

*Credit 3 hours*

Two hours lecture and recitation, three hours of laboratory. A treatment in depth of the principles of plane surveying, with particular emphasis on the analysis of errors, curvilinear surveys, astronomical observations and potential computer relationships. — II. Mr. Koten.

*Prerequisite:* AM 110.

102. MENSURATION

*Credit 3 hours*

Two hours lecture and discussion, one three-hour laboratory. Principles and methods of estimating and projecting net volumes of trees and products; tree form; timber volume determination of logs, trees and stands; growth determination; analyses by graphical and mathematical methods; stand structure adjustments; numerous problems. — II. Staff.

*Prerequisites*: AM 100 or AM 110; FM 1 or F Engr 101.

103. PHOTOGRAMMETRY

*Credit 3 hours*

Two hours of lecture and discussion, three hours of laboratory. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation, and unique requirements are considered. — II. Mr. Stanton.

*Prerequisites:* FM 1 (or F Engr 101 concurrent).

104. ROADS

*Credit 3 hours*

Two hours of lecture, three hours of field and laboratory practice. Engineering principles in the planning, location, design, construction, and maintenance of forest roads. Contract specifications, costs, drainage, typical sections, grades, curves, surfacing materials, use of heavy equipment, and explosives. Principles in the location, installation, and maintenance of communications. — II.

*Prerequisite*: FM 1 or FE 101.

105. STRUCTURES

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Engineering principles in the planning, design, construction and maintenance of forest structures such as timber bridges, trusses, towers, dams, water supplies, sewage systems, and other facilities. Properties of timber, concrete, steel, and other structural materials. — I. Mr. Tully.

*Prerequisite*: ME 29.

106. HYDROLOGY

*Credit 3 hours*

Three lecture-recitations per week. The mechanics of water storage and dispersion; hydrostatics; stream function; velocity potential; dimensional analysis and momentum theory. The natural hydrologic cycle is studied in relationship to changes and structural controls imposed by man. — II. Mr. Tully.

*Prerequisites*: Dynamics (or concurrent), Introductory Statistics.

110. ENGINEERING PROBLEMS

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Intensive study of practical application in forest engineering of certain phases of geodesy, photogrammetry, and civil engineering. Field adjustments of instruments, error evaluation, and legal aspects. — I. Mr. Stanton.

*Prerequisite*: FE 101 or equivalent.

111. PRINCIPLES OF PRODUCTION (HARVESTING)

*Credit 3 hours*

Three lectures per week. Fundamentals of harvesting wood products for optimum utilization; principles of production management, materials handling and transportation systems, inventory and cost control, product and market development; utilization problems. Analysis of integrative case situations for wood-based enterprises. — II. Mr. Palmer.

*Prerequisite*: FE 102 (Mensuration).

## ENGLISH AND SPEECH

MESSRS. CROSSMAN, LALOR, MRS. SUTTON.

### *English*

10a. ADVANCED COMPOSITION AND LITERATURE

*Credit 2 hours*

Further development of reading and writing skills begun in Freshman English. Appreciation of imaginative literature is extended by the study of various literary types — biography, fiction, poetry, drama and the essay — with special attention to their specific nature and to the development of the skills of interpreting such works. Practice in the principles and techniques of writing, with assignments coordinated with the reading materials, is carried on throughout the course. — I. Staff.

### 10b. TECHNICAL WRITING

*Credit 2 hours*

The basic features, characteristics, and forms of technical discourse, with special attention to such expository forms as the abstract, definition, explanation of a process, and technical description in preparation for the writing of a long report dealing with an investigation. Practice is also given in the writing of various kinds of short reports and selected business letters. — II. Staff.

### 110. ADVANCED LITERATURE AND COMPOSITION

*Credit 3 hours*

Lectures and discussions including an explication of tests to give the student an understanding of the specific nature and purpose of selected kinds of literary expression; to provide training in the skills of interpretation useful in understanding and appreciating these works; to acquaint the student with some of the general principles upon which critical evaluation and judgments of such works are made; and to provide practice in the exercise of sensitive, informed, and responsible judgments. — I. Staff.

## *Speech*

### 1. PUBLIC SPEAKING

*Credit 2 hours*

A study of the fundamentals of effective public speaking to develop ability to handle with some ease and competence the demands for speaking which confront the educated person; basic concepts; use of body and voice; preparation and delivery of principal types of talks; and constructive criticism. — II. Staff.

## ENTOMOLOGY (FOREST ENTOMOLOGY)

MR. SIMEONE, *Chairman.* MESSRS. BREZNER, GARA, KRALL, KURCZEWSKI.

Forest Zoology I is prerequisite to all Forest Entomology courses.

### 1. ELEMENTS OF ENTOMOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory and field work. General classification of insects, morphology, physiology, ecology, behavior, and basic principles of population control. — I. Mr. Simeone and assistants.

### 10. PRINCIPLES OF FOREST ENTOMOLOGY

*Credit 2 hours*

Elements of insect classification, living requirements, and control manipulations that are prerequisite with further study, to an understanding of insects in relation to applied aspects of forestry. One hour of lecture, three hours of laboratory and field work. — II. Mr. Gara and assistants.

### 102. FOREST ENTOMOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory/field trip. Important forest insects and their relation to forest stands, management and silviculture practices and forest uses. — II. Mr. Krall.

*Prerequisites*: F Ento 1 or F Ento 10.

### 103. SHADE TREE ENTOMOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory/field trip. Common insects of woody ornamentals are stressed. Relation of environment to insect attack. Modern methods and equipment control and prevention. — II. Mr. Krall. Course offered in odd calendar years.

*Prerequisite*: F Ento 1 or F Ento 10.

### 104. INSECTS AFFECTING FOREST PRODUCTS

*Credit 3 hours*

Two hours of lecture and one hour of laboratory. Biology, chemistry, identification, prevention of injury, and control of insects injurious to forest products and wood in use. — II. Mr. Simeone.

*Prerequisite*: F Ento 1 or F Ento 10.

### 109. INSECT MORPHOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. A comparative study of external morphology of insects; modifications of homologous parts; musculature associated with feeding, locomotion, reproduction, and intersegmental movements. — I. Mr. Kurczewski.

*Prerequisite*: F Ento 1.

### 111. GENERAL INSECT TAXONOMY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Nomenclature, classification, literature, and keys. Insect collection required. — II. Mr. Kurczewski.

*Prerequisites*: F Ento 1, 109.

### 113. INSECT PHYSIOLOGY

*Credit 3 hours*

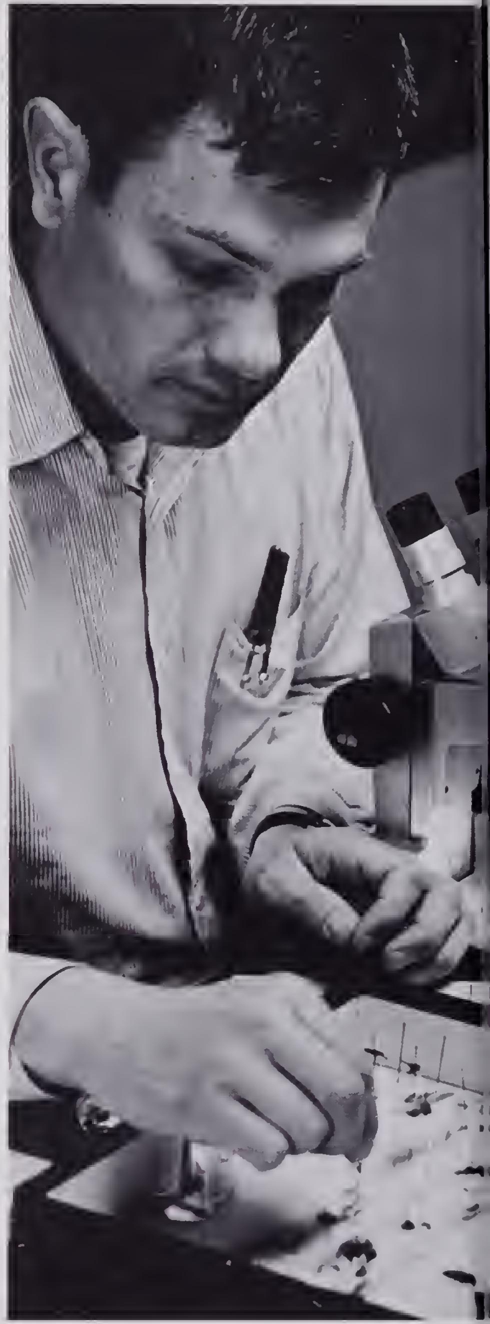
Two hours of lecture, three hours of laboratory. Study of the life processes in insects; introduction to modern physiological instrumentation and laboratory methods. — II. Mr. Brezner.

*Prerequisite*: F Biol 100.

### 116. SURVEY OF ENTOMOLOGICAL LITERATURE AND HISTORY

*Credit 1 hour*

One hour of lecture. A survey of history of entomology and related sciences. Library techniques and literature sources are discussed, with emphasis on entomological bibliography. — I. Mr. Brezner.



200. SEMINAR

*Credit 1 hour*

Assigned reports and discussion of topics in entomology. — I and II. Staff.

201. RESEARCH PROBLEMS IN FOREST ENTOMOLOGY

*Credit hours arranged according to nature of problem*

Comprehensive report required in some projects. — I and II. Staff.

202. SPECIAL TOPICS IN FOREST ENTOMOLOGY

*Credit hours arranged according to nature of work*

Special instruction, conference, advanced study and research projects in the fields of insect toxicology, insect physiology, taxonomy of immature insects, phases of biology and ecology of insects. Typewritten report required in some fields. — I and II. Staff.

203. HISTOLOGICAL TECHNIQUE

*Credit 3 hours*

One hour of conferences, six hours of laboratory. Methods used in the preparation of insect material for microscopic study. — II. Mr. Krall. Given in even calendar years.

*Prerequisites*: F Ento I, 109.

204. AQUATIC ENTOMOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. The biology, ecology, and identification of fresh water insects, with emphasis on the role of aquatic insects in the hydrobiome. — I. Mr. Brezner.

*Prerequisites*: F Ento 1 or its equivalent.

213. ADVANCED FOREST INSECT TAXONOMY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Classification of the important groups of bark and wood boring forest insects. — I. Mr. Krall.

*Prerequisites*: F Ento 1, 109, 111.

214. INSECT ECOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory and field work. Interacting environmental or habitat factors which influence the relative abundance and distribution of insects, ecological principles as applied to problems in forest entomology, biological control, management, methods; class and individual problems. — I. Mr. Gara.

*Prerequisite*: F Ento 113 or its equivalent.

225. THESIS

Credit hours to be arranged. — I and II. Staff.

## GENERAL FORESTRY

1. FOREST RESOURCES AND THEIR USE

*Credit 3 hours*

Lectures, recitation and a field study dealing with forest land, forest products and services and their use by man. The relation of forestry to other forms of land use and the multiple use of forest land are examined. The development of forestry in the United States and other countries is studied in its relation to the welfare of rural people and to the national economy. — I.

100. RANGE MANAGEMENT

*Credit 2 hours*

Two hours of lecture. Range ecology, animal husbandry, management practices and administrative aspects of range resources. — II.

102. INTERPRETING FORESTRY TO THE PUBLIC

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. The principles of communication for forest extension and conservation education. The common audio-visual and printed-message media are covered. Specific topics include principles and techniques involved in lectures, demonstrations, exhibits, flip charts, slide talks, motion pictures, and television. Units of study concerning news coverage through the press, developing public relations and the role of the information-education specialist in forestry, recreation and conservation are included. — II. Mr. Hanselman and Staff.

### 151. WORLD FORESTRY

*Credit 3 hours*

Three hours of lecture and discussion. Introduction to the principal features of the forest situation and major developments and problems in forest resource use that confront the world today. World politics and economics in relation to the availability and use of natural resources. World forest geography; forest resources and values, forestry policy and administration; world trade in forest products; current issues and problems. World forestry goals; international cooperation in forestry; role of the United States in world forestry affairs. — I. Mr. Larson. Open only to seniors and graduate students.

### 191. TROPICAL FORESTRY

*Credit 5 or 9 hours*

Twelve weeks of lectures, seminar discussions, field trips and independent research in tropical forestry, including experience in living and working in the American tropics. One week of orientation in residence at Syracuse; eleven weeks of instruction and field work in Puerto Rico in cooperation with the Institute of Tropical Forestry and University of Puerto Rico. Enrollment limited to fifteen participants selected on a competitive basis from qualified graduates in forestry and allied fields on approval of instructor. — Summer. Mr. Larson in charge.

### 201. PROBLEMS IN WORLD FORESTRY

*Credit hours to be arranged*

Provides an opportunity for the student to pursue his study of forestry, or some phase thereof, in a global, regional or national (United States and Canada excluded) setting, and to gain experience in original thinking and analytical writing. — I and II. Mr. Larson. For graduate students primarily in World Forestry.

### 225. THESIS IN WORLD FORESTRY

Credit hours to be arranged. — I and II. Staff.

## LANDSCAPE ARCHITECTURE

MR. ALBRECHT, *Director*. MESSRS. CURRY, EARLE, FREEMAN, MARAVIGLIA, REIMANN, SCHAAL, SEARS, TEITSCH, VIERTEL, WILLIAMS.

### *Graphics*

### 1. TECHNICAL DRAWING

*Credit 1 hour*

One three-hour drafting room period. Elements of perspective, isometric, oblique and orthographic projection. Practice in freehand and instrument drawing. — I. Mr. Maraviglia.

### 2. TECHNICAL DRAWING

*Credit 2 hours*

Two three-hour drafting room periods. Elements of perspective, isometric, oblique, and orthographic projection. Practical applications of these principles are utilized in the symbols and elements of machine, architectural and topographic drawing.— II. Mr. Maraviglia.

### 3. and 4. GRAPHICS

*Credit 2 hours each semester*

Lectures, discussion and drafting. Perspective, shades and shadows, color, freehand and mechanical line drawing, rendering. — I and II. Mr. Viertel.

*Prerequisites*: Technical Drawing 1 and 2 or equivalent.

### 14. PENCIL TECHNIQUE

*Credit 1 hour per semester*
*(3 hours of laboratory per week)*

Laboratory, field trips, and criticism, composing and rendering finished pencil studies. — I. Mr. Schaal.

### 15. WATER COLOR

*Credit 1 hour per semester*
*(3 hours of laboratory per week)*

Laboratory, field trips and criticism, composing and painting in water color. — II. Mr. Schaal.

### 114. OIL PAINTING

*Credit 1 hour*

Laboratory, field trips and criticism. Composing studies in oil and other color media. — II. Mr. Earle and Staff.

*Prerequisite*: Graphics 15 or the permission of the instructor.

## *Environmental Influences*

### 1. PRINCIPLES OF LAND USE

*Credit 3 hours (3 hours of lecture per week)*

Three hours of lecture-recitation. Explanation of factors which influence the use, development and control of land. Discussion of government's role in land development and control. Detailed consideration of unique values of land, competitors for the use of space, classification of land resources and similar topics. — II. Messrs. Williams and Curry.

### 20. and 21. HISTORY OF ARTS

*Credit 3 hours each semester*

Three one-hour lectures each week, assigned reading, reports, sketches. Comparative study of the important cultural periods of history as seen through the arts with emphasis on the landscape as an environment and as an art. — I and II. Mr. Earle.

### 22. HISTORY OF LANDSCAPE ARCHITECTURE

*Credit 2 hours*

Lectures, assigned reading, reports, sketches. Comparative study of the important cultural periods of Western history as seen through landscape architecture and garden art. Landscape architecture will be studied as a planned environment of man.— II. Mr. Earle.

*Prerequisites*: Standard art history course equivalent to 6 credits or permission of instructor.

### 101. PRINCIPLES OF OUTDOOR RECREATION

*Credit 3 hours (3 hours of lectures per week)*

Lectures, assigned readings, oral reports. Discussion of the importance of outdoor recreation in modern society and factors which contribute to the need for outdoor recreation. Description of types of recreational facilities and the organizations which provide them. Explanation of economic, social and political relationships in outdoor recreation. — II. Mr. Williams.

*Prerequisite*: Open only to juniors, seniors, or graduate students.

### 102. LAND PLANNING

*Credit 3 hours (3 hours of lectures per week)*

Lectures, assigned readings, oral reports, term project. Discussion of the meaning and purposes of land planning, giving specific reference to the contributions of urban and regional planning. Examination of the historical development of urban forms. Explanation of the principal elements of comprehensive plans, including planning administration. Discussion of the methods and objectives of regional planning. — I. Mr. Williams.

*Prerequisite*: Open only to juniors, seniors, or graduate students.

## Landscape Architecture

### 1. BASIC DESIGN

*Credit 3 hours (2 lectures, 3 hours lab per week)*

Lectures, assigned reading, reports, and graphic design. Principles of esthetics and mechanics of design first semester, and a more philosophic study of design concepts and the social and individual attitudes they serve. Abstract drawing exercises and simple landscape design problems. — I and II. Mr. Earle and Staff.

### 2. LANDSCAPE ARCHITECTURAL CONSTRUCTION

*Credit 3 hours (2 hours of lectures, 3 hours of laboratory per week)*

Lectures, problems, drafting, modeling, and assigned reading. The study of land form and its technical expression through grading plans, sections, profiles and earthwork quantity computation. Principles of soil mechanics and land drainage and their application to surface and subsurface drainage systems. — II. Mr. Freeman.

*Prerequisites*: Plane Surveying, Elementary Geology.

### 3. PLANT MATERIALS

*Credit 3 hours. Three weeks at Farmingdale, N. Y., beginning the second week of final examinations for Spring term. The student's expenses for the three weeks are $100-$120.*

Field trips and discussion. Ornamental woody plant identification on and in the vicinity of Long Island. Observation and sketches of outstanding examples of planting design. — Messrs. Viertel and Freeman.

*Prerequisites*: LA 1, F Bot I.

### 22. and 23. LANDSCAPE DESIGN

*Credit 6 hours first semester, 6 hours second semester (2 hours of lectures and 12 hours of laboratory per week)*

Lectures, problems, drafting, and field trips. A succession of both rural and urban landscape architectural problems, such as small parks, schools, and other building sites, introductory to professional work. Principles of basic organization of land areas and composition of elements. — I and II. Messrs. Freeman, Schaal and Staff.

*Prerequisites*: LA 1, 2, and G3, 4 or equivalents.

Student's expense of an extended field trip approximately $70 to $100.

### 30. PLANT MATERIALS

*Credit 2 hours (2 hours lectures per week)*

Two hours per week and integration with Landscape Design problems. Field study, lectures, and drawing. Trees, shrubs, and vines. Identification and design considerations. — I. Mr. Viertel.

*Prerequisites*: Bot 1, LA 3, or equivalent.

### 31. PLANT MATERIALS

*Credit 2 hours (2 hours lectures per week)*

Two hours per week and integration with Landscape Design problems. Field study, lectures, and drawing trees, shrubs, vines, and grasses. Identification and culture. — II. Mr. Viertel.

*Prerequisite*: LA 30.

### 40. and 41. LANDSCAPE ARCHITECTURAL CONSTRUCTION

*Credit 2 hours each semester (2 hours lectures per week)*

Lectures, problems, assigned readings, and field trips. Engineering principles, construction materials, and operations common to landscape architecture. Topics include elementary statics and strength of materials, foundations, concrete, masonry, steps, walks, terraces, retaining walls, dams, water supply, sewage disposal, shore protection, beaches, pools, and other water developments. — I and II. Mr. Sears.

*Prerequisite*: LA 2.

## 116. ARCHITECTURE

*Credit 3 hours (1 hour of lecture, 6 hours of laboratory per week)*

Lectures, written assignments, and drafting. Methods of architectural design and construction. Modular design, structural systems, drafting of architectural details. Architecture, site and area relationships. Design philosophies, responsibilities and relationships of the design professions. One to three-week laboratory problems in architectural design, preparation of presentation and working drawings. — I and II. Mr. Teitsch.

*Prerequisites:* G 3, 4.

## 122.and 123. LANDSCAPE DESIGN

*Credit 6 hours first semester, 6 hours second semester (2 hours of lectures and 12 hours of laboratory per week)*

Lectures, seminars, drafting, field trips and reports. Continuation of landscape architectural problems to complete the undergraduate study and preparation for professional work. A complex problem series considering houses, parks, resorts, recreation areas, and institutional and industrial land uses. Application of extended knowledge in construction and plant materials. Relation of the concepts and practice of architecture, engineering, and city and regional planning. —I and II. Messrs. Reimann, Albrecht, Curry, and Staff.

*Prerequisites*: LA 22 and 23.

Student's expenses of an extended field trip are approximately $70 to $100.

## 140. LANDSCAPE ARCHITECTURAL CONSTRUCTION

*Credit 2 hours (2 hours of lectures per week)*

Lectures, assigned readings, reports. Estimates, specifications, contracts, registration laws, professional ethics, contracts and fees for professional services, and similar topics related to the practice of landscape architecture. — I. Mr. Sears.

*Prerequisites*: LA 40 and 41.

## 141. LANDSCAPE ARCHITECTURAL CONSTRUCTION

*Credit 2 hours (2 hours of lectures per week)*

Lectures, problems, assigned readings, field trips. Principles of highway engineering as

related to landscape architecture including location, geometric design drainage, roadbed construction, pavements and roadside development. — II. Mr. Sears.
*Prerequisites*: LA 40, 41, 140.

200. SEMINAR
*Credit 2 hours*
Discussion of miscellaneous current problems related to planning and management. — I or II. Mr. Albrecht, Staff, and visiting lecturers.

201. RESEARCH PROBLEMS
*Credit hours arranged according to nature of problem*
Special study of assigned problems relating to landscape architecture or planning, with emphasis on critical thinking. — I and II. Staff.

211. LANDSCAPE DESIGN
*Credit 4 hours each semester*
Development of a major landscape design problem involving preparation of a series of related drawings. — I and II. Mr. Albrecht and Staff.
*Prerequisites*: LA 122, 123.

212. LANDSCAPE CONSTRUCTION
*Credit 3 hours*
Lectures, drafting. Detailed study of special landscape construction problems. Preparation of estimates, contracts, and specifications. — I. Mr. Sears and Staff.
*Prerequisite*: LA 141.

213. PLANT MATERIALS
*Credit 2 hours*
Lectures, field work, trips. Special study of woody and herbaceous plant materials, greenhouse operation, and other horticultural practices. — II. Mr. Viertel, Staff, and visiting lecturers.

216. PARK ARCHITECTURE
*Credit 2 hours*
Advanced problems in architectural design for park buildings and preparation of plans. — II. Staff.
*Prerequisites*: LA 122, 116.

217. CITY PLANNING
*Credit 3 hours*
Lectures, reports, assigned readings, and design. Architectural, esthetic and engineering principles. One typewritten report (original and four carbons) required. — I. Mr. Williams.
*Prerequisites:* LA 122, 123.

225. THESIS
*Credit hours to be arranged*
I and II. Staff.

## MANAGEMENT (FOREST MANAGEMENT)

MR. GETTY, *Chairman*. MESSRS. BICKFORD, BURCH, ECHELBERGER, GRAVES, HORN, KASILE, KOTEN, LAPAGE, LEE, PALMER, SHAFER, TULLY, WENGER, WHITTAKER, BROCK, LANCKTON.

1. PLANE SURVEYING
*Credit 3 hours*
Two hours of lecture and recitation, three hours of field or office practice. A comprehensive development of the theoretical principles of plane surveying. Use of modern instruments and methods, computations related to forest activities. — I. Mr. Koten and Staff.
*Prerequisite*: Math 1.

2. INTRODUCTORY ENGINEERING
*Credit 3 hours*
Two hours of lecture and recitation, three hours of field or laboratory. Basic engineering problems confronting the forester, in-

cluding principles of materials and testing, construction locations and analyses, contracts and costs; hydrographic and photogrammetric concepts in forestry. Fundamental to sequence in engineering and measurements. — II. Mr. Stanton and Staff.

*Prerequisite*: FM 1.

### 3. FOREST SURVEYING

*(Summer Camp — 2 hours)*

Elementary field techniques in forest and initial office procedures as used in forestry. Emphasis is placed on the use of less precise instruments for forest mapping. Field work includes problems designed to familiarize the student with basic techniques as well as topographic mapping, traverse board mapping, and forest road layout. Directed by faculty of the Forest Management Department. — Mr. Koten.

### 4. HARVESTING

*Credit 2 hours*

Two hours of lecture. Principles of harvesting primary forest products. Equipment, methods, and economics of the logging industry. — II. Mr. Lee.

### 5. FIELD TECHNIQUES IN FOREST MENSURATION

*(Summer Camp — 2 hours)*

Introduction to field methods of forest stand and tree measurement as used in forestry. Emphasis is given to use of instruments and necessary standards of field practice, and procedures applicable to measurement of individual trees, products, and forest stands. Directed by faculty of the Department of Forest Management. — Mr. Horn and Staff.

### 106. MANAGEMENT PLANNING AND OPERATIONS

*Credit 3 hours*

Three hours of lecture and recitation. The over-all management and operation of a forest property as a productive enterprise, particularly development and expediting of cutting budgets, work plans, and operating schedules. Emphasis is on integration of principles and concepts of mensuration, silviculture, utilization, engineering, economics, administration, and human relations in the context of a practical operating land ownership. — II.

### 112. FOREST ADMINISTRATION AND POLICY

*Credit 3 hours*

Three hours of lecture and recitation. Administrative and executive aspects of forestry. Public and private forest policy formulation; basic principles of organization, planning, public relations, personnel management, budget, and administrative practice. Work and organization of the major agencies engaged in forestry. — I. Messrs. Graves and Getty.

### 114. FOREST MANAGEMENT SEMINAR

*Credit 3 hours*

Three hours of group discussion and analysis. Current literature, plans, and principles, and new developments in forest management. — I. Mr. Horn.

### 115. MANAGEMENT OF THE FOREST BUSINESS

*Credit 3 hours*

Three hours of discussion. Overview of major business management principles and methods of operation in forestry enterprises. Emphasis is on general business concepts which forest managers must use. Actual case studies are basis of instruction. Complementary to FE 111. — I or II. Mr. Horn.

### 117. ADVANCED LOGGING

*Credit 2 hours*

Two hours lecture. Problems of the logging industry from an economic and engineering aspect. Regional characteristics of labor, equipment, methods, and cost. — I. Mr. Lee.

*Prerequisite*: FM 4.

120. PHOTOGRAMMETRY (Mensuration)
*Credit 3 hours*

Two hours of lectures and recitation, three hours of field and laboratory. Stereoscopic examination of aerial photographs. The principles associated with obtaining aerial photographs suitable for forest mensurational purposes; the methods of measuring images and analyzing the measurement information; the field work desirable to improve volume estimates and to supply additional information; area determination, aerial volume table construction, flying specifications, recent developments. — I. Staff.

*Prerequisites*: F Engr 102 and F Engr 103.

121. PHOTOGRAMMETRY (Land Management)
*Credit 3 hours*

Two hours of lecture and recitation, three hours of field and laboratory. Photogrammetric engineering methods in forest land management, cadastral mapping, property control, tax problems, protection, timber and range management, multiple use planning. Location and preliminary planning of transportation systems and other engineering functions. — II. Mr. Stanton.

*Prerequisite*: F Engr 103.

201. FOREST MANAGEMENT PROBLEMS
*Credit hours arranged according to nature of problem*

Hours to be arranged. Special study of assigned problems with emphasis on critical thinking. One typewritten report (original and one carbon) required. — I and II. Staff.

202. APPLIED FOREST MANAGEMENT
*Credit 3 hours*

Principles and practices of forest management as applied to specific forest properties under the guidance of responsible public and private foresters. Several days are spent in the field studying forest conditions, organizations, operations, and problems. By observing actual forest operations, students become acquainted with latest and most efficient forest practices in office and forest. — I. Mr. Graves.

203. ADVANCED FOREST ADMINISTRATION
*Credit 3 hours*

Critical appraisal of existing public, semipublic, and private forestry agencies in the United States, and comparative study of major administrative organizations and practices. Occasional inspection trips to forestry headquarters and field units and discussion of internal administrative problems with forest officers. — II. Mr. Getty.

*Prerequisite*: FM 112 or equivalent.

204. SEMINAR
*Credit 1 hour each semester*

Group discussion and individual conference concerning current topics, trends, and research in management. — I and II. Staff.

205. RESEARCH METHODS IN FOREST MANAGEMENT
*Credit 2 hours*

Instruction of methodology in approach to and solution of problems in Forest Management research. Restricted to graduate students in Forest Management. — I and II. Staff.

225. THESIS

Credit hours to be arranged. — I and II. Staff.

## MATHEMATICS

1. PLANE TRIGONOMETRY
*Credit 3 hours*

Three hours of lecture. The course includes: the six trigonometric functions, the radian measure of angles, the variation and graphs of the trigonometric functions, the solution of right triangles and applications, trigonometric identities, trigonometric equations, inverse trigonometric functions, the general triangle, complex numbers, logarithms, and accuracy of computed results. — I or II. Mr. Green.

### 2. COLLEGE ALGEBRA

*Credit 3 hours*

Three hours of lecture. The course includes a review of the axioms of algebra, the algebraic operations, inequalities, functions and their graphical representation, linear and quadratic functions, determinants, theory of equations, inverse functions, permutations, combinations and probability, the Binomial Theorem, mathematical induction, exponential and logarithmic functions and complex numbers. — I and II. Mr. Green.

## PULP AND PAPER TECHNOLOGY

MR. O'NEIL, *Chairman*. MESSRS. DENCE, GORBATSEVICH, LEOPOLD, LUNER, ROTHENBERG, STENUF, STRAUSS, MRS. MARTON.

### 1. PULP AND PAPER PROCESSES

*Credit 3 hours each semester*

Two hours of lecture, three hours of laboratory and discussion. History of papermaking. Introduction to physical and chemical characteristics of wood. Chemistry and technology of the various pulping and bleaching processes. Physical and chemical treatments involved in papermaking such as refining, sizing, wet strength developments, filling, coloring, and coating. Discussion of printing processes and paper characteristics important to printing. — I and II. Mr. O'Neil.

*Prerequisite or concurrent:* Chem 130.

### 4. MILL EXPERIENCE

*Credit 5 hours*

Twelve weeks full-time pulp or paper mill employment approved by the Department between the Sophomore and Junior years. Ordinarily, the student receives wages or salary while getting the required experience. The student must submit a comprehensive report to fulfill this requirement. An adaptability rating chart furnished by the Department is prepared by the mill for each student employed. — Staff.

### 5. MILL INSPECTION REPORT

*Credit 1 hour*

One week inspection trip to representative manufacturers of pulp and paper, papermaking equipment, plastics, chemicals, or related products selected for demonstrating typical plant scale operations. Ultimate emphasis is on manufacture of pulp and paper. Daily discussions. Typewritten report required on termination of trip. Trip expenses are approximately $60 per student. — II. Staff.

*Prerequisites or concurrent:* P&P 1, 103, 104.

### 101. PRINCIPLES OF MASS AND ENERGY BALANCE

*Credit 3 hours*

Three hours of lecture. Study of the properties of steam and solving problems connected with material and energy balances. — II. Mr. Gorbatsevich.

*Prerequisites or concurrent*: Math 23, Physics, Chem 140, Chem 133.

### 104. PULP AND PAPER UNIT OPERATIONS

*Credit 2 hours first semester,*
*3 hours second semester*

Two hours of lecture first semester, three hours of lecture second semester. Design, construction, and operation of process equipment employed in the pulp and paper industry. Principles of important unit operations in chemical engineering processes. Consideration of flow of liquids, heat transfer, evaporation, diffusion, filtration, gas absorption, and air condition. Emphasis is on application of fundamentals of these processes to manufacture of pulp and paper. Examples studied pertain to this industry. — I and II. Mr. Stenuf.

*Prerequisites*: Phys, P&P 1, Chem 140, P&P 103.

### 107. PROCESS CONTROL FOR THE PAPER INDUSTRY

*Credit 3 hours*

Three hours of lecture. The study and application of measuring means, remote signal transmission, and control elements. Response to signals, lag, dynamic error, cycling and other process control phenomena. The use of electronic computers in the paper industry. Applications of these principles and instruments to the pulp and paper industry is stressed. — I or II. Mr. Stenuf.

*Prerequisites or concurrent*: P&P 1, 104, and Chem 140.

### 108. ECONOMICS OF PULP AND PAPER

*Credit 2 or 3 hours*

Two or three hours of lecture and seminar. Structure and development of the industry and the decisions of management are explained in the light of economic principles. Current industrial trends and problems are discussed. Each student prepares an analytical report on some aspect of industry structure. — II. Mr. Armstrong.

*Prerequisite:* FE 1 or equivalent.

### 109. RESEARCH PROBLEM

*Credit 1 hour*

The Staff of the Department and selected alumni in the paper industry are solicited for research problems of a practical nature in pulping, bleaching, heating, sizing, coloring, coating, and quality testing of pulp and paper and paper products. Student makes a systematic survey of all available literature on the problem assigned him and incorporates it in a formal typewritten report which he submits in duplicate. An essential part of this report is a detailed outline of laboratory research which the student proposes to undertake during the next semester. — I. Staff.

*Prerequisite or concurrent*: P&P 1, 104, FC 120, 125, Chem 130b.

### 110. RESEARCH PROBLEM

*Credit 4 hours*

Twelve hours of laboratory. The research program outlined in P&P 109 is undertaken in the laboratory with the objective of developing original data. Emphasis is on application of correct research techniques rather than the discovery of results of significant commercial importance. Data developed are assembled and evaluated in a comprehensive typewritten report which the student prepares in duplicate and submits to his instructor. A copy of this report is sent to the person suggesting the problem. — II. Staff.

*Prerequisites*: P&P 109, 131, 135.

### 131. PULPING TECHNOLOGY

*Credit 4 hours*

Two hours of lecture, six hours of laboratory. Discussion of variables and mechanisms in pulping and pulp bleaching. Influence of pulp components on paper properties. Analysis of cooking, spent and bleach liquors, evaluation of raw materials in pulping and pulp bleaching. Preparation and evaluation of pulps. Study of pulping and bleaching variables and their influence on physical and chemical properties of pulp. Bleaching of pulps for specific uses. — I. Mr. Gorbatsevich.

*Prerequisites*: P&P 1 and Chem 140.

### 135. PAPER PROPERTIES

*Credit 4 hours*

Two hours of lecture, six hours of laboratory and discussion. Application to pulps of rosin and wax sizes, starches, fillers, wet strength resin and other additives. Evaluation of their effect on paper properties. Characterization of dyestuffs and their use in color matching of commercial papers. Surface coating of paper and its effect on paper properties. Evaluation of chemical, physical, and optical properties of paper and their significance to the end-use of paper. — I. Mr. Strauss.

*Prerequisites*: P&P 1 and Chem 140.

### 139. PAPER TECHNOLOGY LABORATORY

*Credit 3 hours*

Nine hours of laboratory and discussion period. Preparation of stock for various types of paper finishes and the development of material and heat balances are covered. Operation of the semicommercial paper mill equipment in the manufacturing of various grades of paper and paper board. Major assignment is the operation of a 52-inch combination Fourdrinier and cylinder paper machine. Emphasis is on fundamentals of stock preparation, paper machine operation, and testing and evaluation of the finished product. Discussion of paper properties follows each machine run. — II. Messrs. Strauss, Gorbatsevich, and Stenuf.

*Prerequisites*: P&P 1, 103, 104.

### 201. RESEARCH IN PULP AND PAPER TECHNOLOGY

*Credit hours arranged according to nature of problem*

Hours to be arranged. Problems in pulp and paper technology are assigned to properly qualified graduate students. One typewritten report (original and one carbon) required. — I and II.

Prerequisites depend upon nature of problem.

### 202. SEMINAR

*Credit 1 hour*

Discussions and assigned topics in fields related to pulp and paper technology. — I and II. Staff.

### 203. SPECIAL TOPICS

*Credit 1 to 3 hours*

Lectures, conferences, and discussions. Advanced topics in chemical engineering, chemistry and physics as related to fibers, pulps and paper. — I and II. Staff.

### 204. INDUSTRIAL THERMODYNAMICS

*3 credit hours, 3 hours of lecture*

The study and application of thermodynamics, including the first and second law, phase relationships, thermochemistry, the production of work and equilibrium relationships. — I. Mr. Stenuf.

Course given in even calendar years.

*Prerequisite*: Chem 140 or equivalent.

### 225. THESIS

Credit hours to be arranged. — I and II. Staff.

### 231. CHEMICAL MECHANISMS IN PULPING AND BLEACHING PROCESSES

*Credit 3 hours*

Three hours of lectures and discussion of the various structural elements comprising lignin and their reactions under technical pulping and bleaching conditions. Emphasis on the mechanisms of reactions responsible for the degradation, solution and condensation of lignin, the effect of process treatment on the cellulose and hemicellulose constituents, and the relationship of the various chemical transformations to such pulp properties as brightness and strength. Properties of lignin solutions in relation to structure. New research developments pertaining to delignification and fiber purification. — I or II. Mr. Dence.

*Prerequisites*: FC 125, P&P 131, and preferably Chem 250.

### 235. THE STRUCTURE AND MECHANICAL PROPERTIES OF PAPER

*Credit 3 hours*

Three hours lecture and discussion. Morphology and chemical composition in relation to fiber and paper properties. Physics of fiber-water suspensions. Formation and geometry of the paper sheet. Development of interfiber bonding by physical and chemical forces. Examination of current theories of the physical properties of paper. Effect of chemico-mechanical treatment on fibers and fiber structures. The rheological properties of fibers and paper, and their relation to end use. Recent advances in optical and mechanical methods of studying bonding, sheet formation and surface properties. Special paper assignments. — I. Mrs. Marton.

*Prerequisites*: FC 125, and P&P 135.

240. METALLURGY AND CORROSION FOR THE PAPER INDUSTRY

*Credit 3 hours*

Three hours of lecture. The study and application of metallurgy and corrosion for the Pulp and Paper Industries. — I. Mr. Stenuf. Course given in odd calendar years.

*Prerequisite*: Chem 140 or equivalent.

### *Other Graduate Courses*

Graduate students in Pulp and Paper Technology also take courses on the 100, 200 and 300 level from other departments of the College of Forestry and Syracuse University. These courses are selected by the student with the help of his advisor to fulfill the degree requirements and to fit the student's interests. Syracuse University courses that are recommended include, among others:

Chemistry: 144G Colloids; 250 Advanced Organic Chemistry; 245 Chemical Kinetics;

Chemical Engineering: 118G Elementary Systems Analysis; 120G Chemical Process Kinetics; 301 and 344 Chemical Engineering Thermodynamics; 302 Chemical Engineering Kinetics; 303 and 342 Chemical Engineering Methods; 304, 305 and 343 Transport Phenomena;

Mathematics: 121, 122 Probability and Statistics; 180G Programming for Digital Computers; 181-2G Higher Mathematics for Engineers and Scientists.

## RESOURCES MANAGEMENT

1. RESOURCES MANAGEMENT

*Credit 2 hours*

A series of field trips, exercises, case studies and discussions introducing concepts and applications of multiple use in forest management. Consideration of the effects of ownership, forest conditions, economic factors and achieving management objectives (Resources Management Division). Summer Session in Forestry. Instructor — Summer Session Staff.

102. RESOURCES MANAGEMENT

*Credit 3 hours*

The interrelationships between man and forest resources and the multiple services which those resources provide; the extent and nature of responsibilities of the forester to the community and to society in his stewardship of natural resources. — II. Staff.

201. RESEARCH PROBLEMS IN FORESTRY

*Credit hours arranged according to nature of problem*

Special investigation and analysis of resource management problems where integrative relationships of several subject aspects of forestry are a major consideration. — I and II. Staff.

## SILVICULTURE

MR. FARNSWORTH, *Chairman*. MESSRS. BERGLUND, BLACK, ESCHNER, HERRINGTON, LEAF, LEONARD, RICHARDS, STAIRS.

1. SILVICS

*Credit 1 hour. Summer Field Program — One week*

Dynamics of forest development: the species and their several characteristics — including tolerance, growth, survival, and patterns of reproduction; species interrelationships: successional trends — effects on forest stand structure. Observation of forest responses following natural catastrophe, logging, clearing, or fire. Introduction to principles of forest cover manipulation by man.

### 2. SUMMER FIELD SESSION

*Credit 2 hours. Two weeks field laboratory. Instructor — Staff*

Two weeks of applied silviculture field exercises emphasizing stand evaluation and treatment of coniferous and hardwood forest. This course provides the initial instruction in silvicultural practices.

### 101. PRINCIPLES OF SILVICULTURE

*Credit 3 hours*

Two hours of lecture and three hours of laboratory. The forest as a community. Site factors and forest stand dynamics. Introduction to manipulation of forest cover to meet objectives of forest owner. — II. Mr. Farnsworth.

*Prerequisites:* Summer Camp, F Bot 10, or F Bot 110 concurrently, or permission of instructor.

### 102. SOILS

*Credit 2 hours*

Three hours of lecture. Fundamentals of soil science with particular reference to forestry. — I. Mr. Leaf.

### 103. SOILS LABORATORY

*Credit 1 hour*

Three hours of laboratory to be taken concurrently with, or with permission, subsequent to Silviculture 102. Laboratory aspects of soil with particular reference to forestry. — I. Mr. Leaf.

### 104. PRACTICES OF SILVICULTURE

*Credit 3 hours*

Two hours of lecture and one three-hour laboratory or field trip. Theory and practices of silvicultural manipulation of forest stands to gain objectives of the forest owner. Emphasis is on thinning, reproduction cuttings, planting, and other silvicultural operations in their relationships to economic and ecological factors. — I. Mr. Farnsworth.

*Prerequisite:* Silvi 101 or permission of the instructor.

### 105. ADVANCED PRACTICE OF SILVICULTURE

*Credit 3 hours*

One hour of lecture, six hours of field work. Problems in silviculture treatment of woodlands under intensive management. Weekly trips to forest areas in New York. Marking, cutting and detailed study of selected areas. — I. Mr. Richards.

*Prerequisite:* Silvi 104.

### 106. PRINCIPLES OF REFORESTATION

*Credit 2 hours*

Two hours lecture, three hours discussion, laboratory, or field trips. Elements involved in reforestation decision-making, including artificial establishment as a silvicultural practice, seed handling and evaluation, seedling quality and nursery production, planting site evaluation, mechanics of forest establishment by seeding or planting. — II. Mr. Richards.

*Prerequisites:* F Bot 10, Silvi 101, or equivalent. Silvi 102 prerequisite or to be taken concurrently.

### 107. FOREST TREE IMPROVEMENT

*Credit 3 hours*

Two hours of lecture, three hours of laboratory or field work. General principles and methods of tree improvement practiced in this country and abroad. Tree selection, techniques of vegetative propagation, hybridization, polyploidy, establishment of seed orchards, clonal and offspring testing and other problems. — II.

*Prerequisite:* F Bot 105 strongly advised.

### 110. PRINCIPLES OF WATERSHED MANAGEMENT

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. The relation of forest and range vegetation to its environment, and its effect upon soil and water. Measurement of precipitation, runoff, erosion and other variables. — I and II. Mr. Eschner and Mr. Black.

### 111. METEOROLOGY AND FIRE BEHAVIOR

*Credit 3 hours*

Lectures and recitations in atmospheric physics and the physics and chemistry of combustion lead to discussions of fire behavior and the strategy and tactics of fire suppression. — I. Mr. Herrington.

*Prerequisite*: Physics 1 (Calculus helpful but not required).

### 112. SILVICULTURAL SEMINAR

*Credit 2 or 3 hours*

Group study of selected silvicultural problems or situations of mutual interest. Emphasis is on critical evaluation and analysis and on organization and presentation of results from individual study for group consideration. — II. Staff.

### 113. SOIL AND WATER CONSERVATION

*Credit 3 hours*

Lectures, seminar reports, and topical reviews on social and technical principles of land management for conservation of soil and water resources. — II. Mr. Black.

*Prerequisite*: Silvi 102.

### 114. REGIONAL STUDIES

*Credit 2 hours*

Study and analysis of the many factors that influence the silvicultural management of the important tree species of North America. These factors include importance of forest and forestry to a designated region, physiography geology, soils, climate and weather, sites and site types, ecology, problems of protection and silvical characteristics of the more important species. — I.

*Prerequisite*: Silvi 104.

### 115. FOREST SOILS

*Credit 3 hours*

One hour of lecture, one hour of discussion, four hours of laboratory, field study of forest soils. Effect of silvicultural operations on soil. Selection of tree species for planting on different soils. Tree growth and development — soil properties relationships. Methods of soil sampling and laboratory analysis. — I. Mr. Leaf.

*Prerequisites*: Silvi 102 and 103.

### 116. FORESTRY TRIP

*Credit 2 hours*

Three weeks' study tour to national, state and private forest operations and to public and private forest experiment stations mainly in southern states. Starts two weeks before registration of first semester. — I. Staff.

(Consult instructor as to transportation fee and personal expenses).

### 120. PRACTICE OF WATERSHED MANAGEMENT

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. The impact of the multiple use of forest and range lands on water yield and soil stability. Regional problems and potential solutions. — II. Mr. Eschner.

### 122. CLIMATOLOGY

*Credit 3 hours*

Three hours of lecture. Survey of the elements of climate and the exchange of heat, moisture, and momentum between the earth and the atmosphere. Emphasis on climate in the vegetated layer and applications of empirical climatological procedures. — II. Staff.

*Prerequisite*: Permission of advisor and instructor.

### 200. GRADUATE SILVICULTURE SEMINAR

*Credit 1 hour each semester*

Three hour class discussion per week. Assigned reports and discussion of silvicultural topics. — I and II. Mr. Farnsworth and Staff.

### 201. RESEARCH PROBLEMS IN SILVICULTURE

*Credit hours arranged according to nature of problem*

Hours to be arranged. — I and II. Staff.

### 207. ADVANCED FOREST TREE IMPROVEMENT

*Credit 3 hours*

Two hours lecture and discussion, three hours laboratory. A study of advanced principles and techniques for genetic improvement ot forest trees. Special emphasis is placed on selection and breeding for growth rates, wood quality, and insect and disease resistance. Problems of tree hybridization, racial variation, sexual reproduction, and quantitative genetics in forest trees. Laboratory training in cytology and cytogenetics, pollen germination, vegetative propagation and other problems. Independent research problems will be undertaken by the student. — I or II. Mr. Stairs.

*Prerequisites*: F Bot 105, Silvi 107.

### 215. FOREST SOIL FERTILITY (APPLIED STUDIES)

*Credit 2 to 4 hours*

Two hours of lecture, one hour of discussion, three to six hours of laboratory depending on number of credit hours. Influence of soil fertility on development and growth of seedlings and trees, and techniques involved to determine this influence. Chemical and biological analyses to determine levels of soil fertility. Nutrient element deficiencies and their correction by soil amendments and fertilizers. Term projects by the student will be undertaken. — II. Mr. Leaf.

*Prerequisites*: Chem 32A, Bot 110, Silvi 115, or equivalent.

### 217. QUANTITATIVE GENETICS IN FOREST TREE IMPROVEMENT

*Credit 3 hours*

Two-hour lecture and discussion, three hours laboratory. Development of statistical models for determining heritability in forest trees. Breeding models and computer analysis application in forest genetics. — I or II. Mr. Stairs.

*Prerequisites*: F Bot 105, Silvi 107, AM 200, or equivalents.

### 225. THESIS

Credit hours to be arranged. — I and II. Staff.

### 235. PHYSICAL PROPERTIES OF FOREST SOILS

*Credit 2 to 4 hours*

Two hours of lecture and one hour of discussion, and none to six hours of laboratory depending on number of credit hours. Relations of soil physics to tree development, and techniques involved to determine this influence. Physical analyses to determine levels of soil moisture and aeration. Soil textural and structural properties of forested soils. Term projects by the student will be undertaken. — II. Staff.

*Prerequisites*: Silvi 102, 103, 110, 115 or their equivalents.

### 250. MICROMETEOROLOGY

*Credit 3 hours*

Two hours lecture and three hours of laboratory. A comprehensive study of the physical processes taking place in the lowest layer of the atmosphere. Primary emphasis on the turbulent transfer of heat, momentum, and water vapor and the expression of these fluxes in the microclimate. Mr. Herrington.

*Prerequisites*: Silvi 122, Physics, and Calculus.

## WOOD PRODUCTS ENGINEERING

Mr. E. Anderson, *Chairman.* Messrs. Bishop, Côté, Davidson, deZeeuw, Moore, Pentoney, Siau, Skaar, G. Smith, L. Smith.

### 4. INTRODUCTION TO FOREST PRODUCTS

*Credit 2 hours*

Two hours of lecture. Characteristics of the products of the forest tree and manufacture of wood products. — II. Mr. Bishop.

### 6. ELEMENTARY WOOD TECHNOLOGY

*Credit 2 hours*

One hour of lecture, three hours of laboratory. Structure of wood in relation to defects, properties and uses. The variability of wood. Identification of major commercial U. S. timber by gross features. — I. Mr. deZeeuw and Staff.

*Prerequisite:* Bot 1 or 2.

### 8. ELEMENTARY WOOD TECHNOLOGY

*Credit 4 hours*

Two hours of lecture, six hours of laboratory. Identification variability and anatomical characteristics of wood and papermaking fibers. Uses, properties and sources of wood and fibers. Structure of wood in relation to defects, properties and uses. — II. Mr. deZeeuw and Staff.

*Prerequisite:* Bot 1 or 2.

### 22. MECHANICAL PROCESSING I

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Principles of the conversion of raw material in log form to primary wood products. Elements of the grading of raw materials and primary products. Elements of production planning and control in the wood industry. — I. Mr. Moore and Staff.

### 46. LIGHT CONSTRUCTION MATERIALS

*Credit 2 hours*

Two hours of lecture. Properties and uses of materials associated with light frame construction; millwork, insulation, roofing, siding, etc. — II. Mr. G. Smith.

### 52. WOOD PRODUCTS ENGINEERING EXPERIENCE

*Credit 5 hours*

Twelve weeks employment in a production laboratory or marketing phase of wood products engineering. Ordinarily, the student receives wages or salary while getting this experience. A comprehensive report describing the student's work is required. Must be completed prior to registering for the first semester of Senior year. — Staff.

### 100. PHYSICAL AND MECHANICAL PROPERTIES OF WOOD

*Credit 4 hours*

Three hours of lecture, three hours of laboratory. A study of the physical and mechanical properties of wood in relation to its use and processing. — I. Mr. Davidson.

*Prerequisites:* WPE 8, Physics 1b or equivalent, Math 22 or equivalent.

### 101. RESEARCH PROBLEM

*Credit 1 to 3 hours*

Hours to be arranged. Conferences, library, laboratory and/or field research on a specific problem in wood products engineering. Typewritten report (original and one carbon) required. — I or II. Staff.

*Prerequisite*: consent of instructor.

### 102. SENIOR SEMINAR FOR WOOD PRODUCTS ENGINEERING MAJORS

*Credit 2 hours*

Discussion and assigned reports on current problems and new developments in wood products engineering. — II. Mr. Anderson and Staff.

*Prerequisite*: Senior standing.

### 108. COMMERCIAL TIMBERS OF THE WORLD

*Credit 3 hours*

One hour of lecture, one hour of conference, three hours of laboratory and assigned reading. Important commercial timbers of the world, their structure, physical properties, identification, supply, and uses. — I. Mr. deZeeuw.

*Prerequisite*: WPE 8.

### 110. TIMBER MECHANICS

*Credit 4 hours*

Three hours of lecture first semester, three hours of laboratory second semester. Mechanical properties of wood and elements of structures. Lectures, problems, and use of timber-testing equipment. — II. Staff.

*Prerequisites*: Calculus, Physics and WPE 100.

### 112. DESIGN OF WOOD STRUCTURAL ELEMENTS

*Credit 3 hours*

Lectures plus laboratory exercises. A development of the principles involved in designing structural elements in wood and practice in their application. — I. Staff.

*Prerequisite*: WPE 110.

### 114. ELASTICITY OF WOOD AND PLYWOOD

*Credit 3 hours*

Theory of elasticity as applied to solid and laminated wood, sandwich material, and plywood. Elements of wood plasticity. — II. Mr. Davidson.

*Prerequisites*: WPE 110 and Physics 102.

### 122. MECHANICAL PROCESSING II

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Technology of the cutting and bending of wood as applied to the wood industry. Elements of machine and tool design and the proper use of processing machinery. Anatomical and mechanical properties of wood in relation to processing techniques. — II. Mr. Moore.

*Prerequisites*: Calculus, Physics and WPE 100.

### 132. ADHESION AND ADHESIVES

*Credit 4 hours*

Three hours of lecture, three hours of laboratory. Physical and chemical properties of adhesive type polymers. Theories of adhesion and cohesion. Chemical architecture, performance and use of adhesives. — I. Mr. L. Smith.

*Prerequisites*: Physics and Organic Chemistry.

### 134. VENEER AND PLYWOOD MANUFACTURING

*Credit 3 hours*

Two hours of lecture and discussion, three hours of laboratory. Veneer cutting, clipping, drying, and methods of reducing waste. Principles involved in cold pressing, hot pressing, fluid pressure application, radio-frequency heating in manufacturing plywood, laminations, assembly gluing, and modified wood. In the laboratory, techniques are applied and strength of glue bonds are evaluated by various methods of testing. — II. Mr. Bishop.

*Prerequisite*: WPE 132.

### 138. WOOD COATING TECHNOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Physical and chemical properties of organic coatings. Composition, formulation, application, performance and use of architectural paints and industrial finishes. — II. Mr. L. Smith.

*Prerequisite*: WPE 132.

### 142. WOOD-WATER RELATIONSHIPS

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Consideration of basic wood-water relationships and the drying of lumber and other wood products. — II. Mr. Skaar.

*Prerequisite*: WPE 100.

### 146. LIGHT CONSTRUCTION

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Elements of light frame construction, blueprint reading, and estimating. — I. Mr. G. Smith.

*Prerequisite:* WPE 46.

### 148. LUMBER MERCHANDISING AND SALESMANSHIP

*Credit 3 hours*

Three hours of lecture, discussion and demonstration. Organization and operation of wholesale and retail lumber distribution agencies. Layout equipment, policies and problems. Principles of salesmanship and their application in the American lumber industry. — I. Mr. G. Smith.

### 152. FIELD TRIP

*Credit 2 hours*

Two weeks supervised study and reporting of representative wood products industries. — II. Staff. Required of all students in WPE. Individual expenses are $100-$150 while on the trip.

### 156. MICROTECHNIQUES OF THE TISSUES OF WOODY PLANTS

*Credit 3 hours*

One hour of lecture, six hours of laboratory. Preparation of the tissues of woody plants for sectioning. Techniques of embedding, sectioning, staining and mounting. Theory of staining. Specimen preparation for light and electron microscopy. — I. Mr. Côté.

*Prerequisite*: WPE 8, except by special arrangement.

### 158. PHOTOMICROGRAPHY

*Credit 2 hours*

Lectures and laboratory. Practice in making photomicrographs of sections of woody plant tissues and other biological materials. Developing, printing, enlarging, use of special light fibers, chemistry of photography, and introduction to electron microscopy. — II. Mr. Côté.

*Prerequisites*: WPE 8, WPE 156, except by special arrangement.

### 162. WOOD PRESERVATION

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Agencies of wood description, wood preservatives, fire retardants, methods of treatment, properties of treated wood and economic aspects. — I. Mr. Bishop.

### 164. ADVANCED WOOD PRESERVATION

*Credit 3 hours*

Two hours of lecture and discussion, three hours of laboratory with laboratory reports required on analysis of treatments. — II. Mr. Bishop.

### 166. PRODUCTION MANAGEMENT OF WOODWORKING INDUSTRIES I

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Production planning and control.

Motion and time study, organizations and other aspects of management. Includes a comprehensive laboratory problem dealing with a proposed plan for establishing a typical woodworking plant. — I. Staff.

*Prerequisite*: Senior status.

### 168. PRODUCTION MANAGEMENT OF WOODWORKING INDUSTRIES II

*Credit 3 hours*

Two hours of lecture and three hours of laboratory. Layout planning techniques and engineering economy for woodworking industries. Plant problems in production. — II. Staff.

*Prerequisite*: WPE 166, Senior status.

### 170. CASE STUDIES

*Credit 2 hours*

Two hours of recitation and discussion. A study of cases selected to illustrate management problems in the wood products industries. — II. Mr. G. Smith.

*Prerequisite*: Senior standing in WPE.

### 174. ADVANCED TOPICS

*Credit 2 or 3 hours*

Lectures, conferences, discussions, and laboratory. Advanced topics in wood products engineering, including advanced studies in one or more of the basic areas covered in other courses in wood products engineering. — I or II. Staff.

*Prerequisite*: Consent of instructor.

### 201. RESEARCH IN WOOD PRODUCTS ENGINEERING

*Credit arranged according to nature of problem*

Investigations on directed study in wood products engineering including manufacturing, marketing, anatomy, physics, quality and mechanical properties of wood. One typewritten report (original and one carbon) required. — I and II. Staff.

### 202. WOOD PRODUCTS ENGINEERING SEMINAR

*Credit 2 or 3 hours*

Conference, discussion and reports analyzing current research and new developments, new literature and subject matter surveys in wood products engineering. — I and II. Mr. Anderson and Staff.

### 208. ULTRASTRUCTURE OF PLANT CELL WALLS

*Credit 2 hours*

One hour of lecture, two hours of demonstration and discussion. The organization and sculpturing of the walls of plant cells, the structure of pits and other cell features, and the characteristics of the cell wall constituents. The tools and techniques used for the study of the cell wall and the interpretation of evidence from the electron microscope, light microscopes and other specialized instruments are demonstrated. Directed study and discussion of the latest literature. — I. Mr. Côté.

*Prerequisites*: WPE 8, FC 125, or equivalents.

### 214. RHEOLOGY OF WOOD AND POLYMERS

*Credit 3 hours*

Three hours of lecture. General principles of mechanical behavior with applications to wood and polymer systems. — I. Mr. Pentoney.

*Prerequisites*: Chem 140, Math 181, Phys 33 or equivalent.

### 218. ADVANCED WOOD PHYSICS

*Credit 3 hours*

The physics of wood and wood-base materials. Treatment of wood-moisture relations with emphasis on movement of liquids and heat through wood. Derivation of the diffusion equations and their application to wood-treating and wood-drying processes. — I. Mr. Skaar.

*Prerequisites:* WPE 118, Math 181.

225. THESIS

Credit hours to be arranged. — I and II. Staff.

## ZOOLOGY (FOREST ZOOLOGY)

Mr. Alexander, *Chairman.* Messrs. Dindal, Hartenstein, Mattfeld, Patric, Payne, Price, Tierson, Webb, Werner.

1. GENERAL ZOOLOGY

*Credit 4 hours*

Prerequisite to all other courses in Forest Zoology. Three hours of lecture and recitation, three hours of laboratory. A general study of the animal organism, its development, structure, and function; and a survey of selected phyla with emphasis on the principles of taxonomy, distribution, genetics, evolution, and the role of animals in the forest. — II.

10. WILDLIFE CONSERVATION

*Credit 3 hours*

Two hours of lecture, one hour of recitation. Introduction to the biological principles of conservation including the relationship of natural resources to modern society. The wildlife resource and its conservation will be emphasized. It is not open to students majoring in Forest Wildlife Management. — I. Mr. Payne.

*Prerequisite*: One semester of a biological science.

100. PRINCIPLES OF WILDLIFE MANAGEMENT

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. A study of the principles governing management of forest and range wildlife and of the biological-economic-sociological mechanism involved. — II. Mr. Webb.

105. VERTEBRATE ANATOMY

*Credit 4 hours*

Three hours of lecture and recitation, 3 hours of laboratory. Comparative study of the anatomy of representative vertebrates, emphasizing structural, functional and developmental characteristics at both macro- and micro-levels. — I. Mr. Price.

*Prerequisite*: A course in General Zoology I.

111. INVERTEBRATE ZOOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Structure, classification, and probable descent of invertebrate animals. Emphasis on their relationships to the forest community. — II. Mr. Dindal.

113. LABORATORY TECHNIQUES IN WILDLIFE MANAGEMENT

*Credit 3 hours*

Two hours of lecture and discussion, three hours of laboratory. Laboratory techniques involved in making full use of zoological materials. Collection, preparation, preservation, and study of pathological, embryological, and food materials. — I.

115. LIMNOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. An introduction to the ecology of inland waters. Emphasis on the lake as an aquatic habitat and the contained communities. — I. Mr. Werner.

116. ICHTHYOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. An introduction to the anatomy, physiology, ecology, behavior and taxonomy of fishes. — II. Mr. Werner.

### 120. ANIMAL ECOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Relations of animals to their physical, chemical, and biological environment. Emphasis on community principles, succession, distribution, migrations, adaptations and population dynamics. — I. Mr. Alexander.

### 121. VERTEBRATE TAXONOMY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Identification and classification of vertebrates of the forest community. Emphasis on use of keys and recognition and significance of distinguishing characters. — II. Mr. Alexander.

### 122. LAKE, POND AND STREAM MANAGEMENT

*Credit 2 hours*

One hour of lecture, three hours of laboratory. Principles and techniques of managing fisheries resources in fresh-water environments. — II. Mr. Werner.

*Prerequisite*: F Zoo 115.

### 130. ANIMAL PHYSIOLOGY

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. A study of animal activities at the cell, tissue, and organ level. — II.

*Prerequisite*: F Biol 100.

### 145. VERTEBRATE POPULATION ECOLOGY

*Credit 3 hours*

Two hours of lecture and one three-hour laboratory per week. Fundamental parameters of population structure and change with emphasis on vertebrate species.

*Prerequisite*: A course in general ecology I-II.

### 150. PRINCIPLES OF ANIMAL BEHAVIOR

*Credit 3 hours*

Three hours of lecture per week. A study of the basic principles of animal behavior, stressing the interplay of exogenous and endogenous control of behavior. — II. Mr. Price.

*Prerequisite*: General Zoology.

### 200. PRACTICE OF WILDLIFE MANAGEMENT

*Credit 3 hours*

Two hours of lecture and conference, three hours of laboratory. An advanced course in wildlife management. Emphasis is on evaluation of environments, development of management plans, and coordination of management with economics, land uses and legal restrictions. The course is concerned with the application of current practices and the development of new practices. — I. Mr. Alexander.

*Prerequisite*: F Zoo 100.

### 201. PROBLEMS IN FOREST ZOOLOGY

*Credit arranged according to nature of problem*

Hours to be arranged. Individual study of special problems in forest zoology. One typewritten report (original and one carbon) required. — I or II. Staff.

### 202. FOREST ZOOLOGY SEMINAR

*Credit 1 hour*

Two hours of discussion and assigned reports on current problems and new developments in forest zoology. — I or II. Staff.

203. ENVIRONMENTAL ANALYSIS

*Credit 2 hours*

One hour of lecture and discussion, three hours of laboratory. Detailed studies of methods used in determining environmental composition, and in interpretation of forest and range analysis data used in preparation of wildlife management programs. — II. Mr. Webb.

205. ZOOGEOGRAPHY OF NORTH AMERICA

*Credit 3 hours*

Two hours of lecture, three hours of laboratory. Geographic distribution of North American vertebrates, factors determining their distribution and nature of range occupied. — I.

220. WILDLIFE MANAGEMENT TRIP

*Credit 1 to 3 hours*

A one- to two-week trip to state and federal agencies engaged in wildlife administration, management and research. Includes inspection, conferences, and preparation of a report. — I or II. Staff.

225. THESIS

Credit hours to be arranged. — I and II. Staff.

## SYRACUSE UNIVERSITY COURSES INCLUDED IN THE COLLEGE OF FORESTRY CURRICULUMS

### College of Liberal Arts

| | *Credit Hours* |
|---|---|
| Chemistry 6a & 6b, General Chemistry | 4-4 |
| Chemistry 132, Quantitative Analysis | 2 |
| Chemistry 133, Quantitative Analysis Lab | 1 |
| Chemistry 134, Instrumental Methods | 2 |
| Chemistry 135, Instrumental Methods Lab | 1 |
| Chemistry 140a & 140b, Physical Chemistry | 3-3 |
| Chemistry 141a & 141b, Physical Chemistry Lab | 1-1 |
| English 1a & 1b, Basic Freshman English | 3-3 |
| English 2a & 2b, Advanced Freshman English | 3-3 |
| English 6a & 6b, English for Foreign Students | 3-3 |
| Geology 1, Introductory Geology | 3 |
| Mathematics 1, Plane Trigonometry | 3 |
| Mathematics 2, College Algebra | 3 |
| Mathematics 3, Elementary Analytic Geometry | 3 |
| Mathematics 95, Analytic Geometry and Calculus | 3 |
| Mathematics 101a, Differential Calculus | 3 |
| Mathematics 101b, Integral Calculus | 3 |
| Mathematics 101c, Topics in Calculus | 3 |
| Mathematics 105a, Calculus II | 3 |
| Mathematics 105b, Calculus III | 3 |
| Mathematics 105c, Calculus IV | 3 |
| Physics 1a & 1b, General Physics | 4-4 |
| Physics 11, General Physics for Science Students | 4 |
| Physics 12, General Physics for Science Students | 4 |
| Physics 102, Advanced General Physics | 3-3 |

### College of Business Administration

| | |
|---|---|
| Business Law 101, Basic Concepts and Applications | 3 |
| Business Statistics 1, Basic Statistics | 3 |

### College of Engineering

| | |
|---|---|
| ME 29, Engineering Mechanics | 4 |
| ME 31, Engineering Mechanics | 3 |
| CE 120, Mechanics of Deformable Bodies | 3 |
| CE 180, Soil Mechanics and Foundations | 3 |

### School of Speech and Dramatic Art

| | |
|---|---|
| Public Address 51 | 3 |

### Reserve Officer Training Corps

Air Force Reserve
Army Reserve

# VIII

# THE COLLEGE FACULTY

The date in parenthesis after each name denotes the first year of service, two or more dates, the term of service.

## FACULTY EMERITUS

Lawrence J. Belanger (1947-1965)
*Professor of Accounting; Registrar*
B.S., Syracuse University, 1932; M.S., New York State College for Teachers, Albany, 1941

Harold C. Belyea (1917-1956)
*Professor of Forest Management*
B.A., University of Mount Allison, 1908; M.A., 1911; B.Sc.F., University of New Brunswick, 1911; M.F., Yale University, 1916

Nelson C. Brown (1912-1917), (1921-1951)
*Professor of Forest Utilization*
A.B., Yale University, 1906; M.F., 1908

Laurie D. Cox (1914-1946)
*Professor of Landscape Engineering*
B.S., Acadia University, 1903; B.S., Harvard University, 1908; D.Sc., Acadia University, 1931; D.C.L., New England College, 1950

James E. Davis (1947-1965)
*Professor of Forestry*
B.S., Cornell University, 1924; M.F., 1926

Carlyn C. Delavan (1926-1957)
*Professor of Forest Engineering*
A.B., University of Michigan, 1914; M.S.F., 1915

Wilford A. Dence (1920-1961)
*Professor of Forest Zoology*
B.S., New York State College of Forestry, 1920

James F. Dubuar (1919-1957)
*Director of Ranger School; Professor of Forestry*
A.B., University of Michigan, 1913; M.S.F., 1915

Carl C. Forsaith (1917-1959)
*Professor of Wood Technology*
B.A., Dartmouth College, 1913; M.A., Harvard University, 1914; Ph.D., 1917

Clifford H. Foster (1927-1959)
*Professor of Forestry*
B.S., New York State College of Forestry, 1921; M.F., 1922; M.S., Harvard University, 1924

William M. Harlow (1928-1965)
*Professor of Wood Technology*
B.S., New York State College of Forestry, 1925; M.S., 1926; Ph.D., 1928

**Ray R. Hirt** (1921-1959)
*Senior Professor of Forest Botany*
B.S., Hamline University, 1917; M.S., New York State College of Forestry, 1924; Ph.D., 1928

**Raymond J. Hoyle** (1918-1957)
*Professor of Forest Utilization*
B.S., New York State College of Forestry, 1917; M.S., Syracuse University, 1930

**Joseph S. Illick** (1931-1951)
*Dean*
A.B., Lafayette College, 1907; B.F., Biltmore Forest School, 1911; F.E., 1913; M.S., Juniata College, 1925; D.Sc., Lafayette College, 1927; LL.D., Syracuse University, 1952

**Ralph T. King** (1937-1965)
*Professor of Forest Zoology*
B.S., Utah State Agricultural College, 1924; M.S., 1925

**Orrin L. Latham** (1930-1966)
*Associate Professor of Forestry*
B.S.F., Iowa State College, 1927; M.F., Yale University, 1932

**Clyde Leavitt** (1932-1943)
*Assistant Dean*
B.A., University of Michigan, 1901; M.S.F., 1904

**Aubrey H. MacAndrews** (1926-1962)
*Professor of Forest Entomology*
Truro Agriculture College, 1923; B.S., New York State College of Forestry, 1925; M.S., 1926

**Henry F. A. Meier** (1912-1914), (1929-1946)
*Professor of Forest Botany*
B.A., Indiana University, 1912; M.A., 1913; Ph.D., Columbia University, 1920

**Lucian P. Plumley** (1936-1967)
*Director of Ranger School; Professor of Forestry*
New York State Ranger School, 1931; B.S., New York State College of Forestry, 1935

**John C. Sammi** (1929-1967)
*Professor of Forest Management*
B.S., University of California, 1922; M.F., New York State College of Forestry, 1931

**Hardy L. Shirley** (1945-1967)
*Professor of Forestry; Dean*
B.A., Indiana University, 1922; Ph.D., Yale University, 1928; D.h.c., University of Helsinki, 1958; D.Sc., Syracuse University, 1966

**LeRoy C. Stegeman** (1929-1965)
*Professor of Forest Zoology*
B.S., Michigan State College, 1928; M.S., University of Michigan, 1929

**Ralph G. Unger** (1937-1964)
*Professor of Forest Extension*
B.S., New York State College of Forestry, 1930

**Walter L. Welch** (1950-1965)
*Associate Professor of Landscape Architecture*
A.B., Syracuse University, 1946

**Harold G. Wilm** (1953-1966)
*Professor of Forest Influences; Associate Dean*
B.S., Colorado College, 1929; M.F., Cornell University, 1930; Ph.D., 1932

**Louis E. Wise** (1919-1932)
*Professor of Forest Chemistry*
B.A., Columbia University, 1907; Ph.D., 1911

## COLLEGE FACULTY

George J. Albrecht (1946)
*Professor of Landscape Architecture; Director of School of Landscape Architecture*
B.S., New York State College of Forestry, 1930

Maurice M. Alexander (1949)
*Professor of Forest Zoology; Chairman of Department*
B.S., New York State College of Forestry, 1940; M.S., University of Connecticut, 1942; Ph.D., State University of New York College of Forestry, 1950

David G. Anderson (1959)
*Assistant Dean for Administration; Assistant Professor of Forestry*
New York State Ranger School, 1950; B.S., State University College of Forestry at Syracuse University, 1953; M.S., University of Utah, 1958

Eric A. Anderson (1950)
*Professor of Wood Products Engineering; Chairman of Department*
B.S.F., University of Washington, 1932; Ph.D., State University of New York College of Forestry, 1959

George R. Armstrong (1950)
*Associate Professor of Forestry Economics*
B.S., State University of New York College of Forestry, 1949; M.S., 1959; Ph.D., 1965

James P. Bambacht (1967)
*Instructor, Pulp and Paper Technology*
A. B., Kalamazoo College, 1954; M. S., The Institute of Paper Chemistry, 1956

Robert H. Baum (1964)
*Assistant Professor, Biochemistry Research*
B.S., Cornell University, 1957; Ph.D., University of Illinois, 1962

John D. Bennett (1960)
*Assistant Professor of Forestry Economics*
B.A., Ohio Wesleyan University, 1954

C. Allen Bickford (1963)
*Professor of Statistics*
B.S., Dartmouth College, 1925; M.S., University of Idaho, 1931

Alfred H. Bishop (1942)
*Associate Professor of Wood Products Engineering; Retriever-Abstractor for State Technical Services Program*
New York State Ranger School, 1925; B.S., New York State College of Forestry, 1929; M.F., 1931

Peter E. Black (1965)
*Assistant Professor of Silviculture*
B.S., University of Michigan, 1956; M.F., 1958; Ph.D., Colorado State University, 1961

Robert H. Brock, Jr. (1967) ....
*Associate Professor of Photogrammetry*
B. S., State University College of Forestry at Syracuse University, 1958; M. S., State University College of Forestry at Syracuse University, 1959

Jerome Brezner (1961)
*Associate Professor of Forest Entomology*
A.B., University of Rochester, 1952; A.M., University of Missouri, 1956; Ph.D., 1959

William R. Burch (1967)
*Professional Research Associate, Forest Management*
B.S., University of Oregon, 1955; M.S., 1957; Ph.D., University of Minnesota, 1964

Harry W. Burry (1962)
*Assistant Professor, Forest Extension; Wood Utilization Team*
B.S., New York State College of Forestry, 1941; M.F., State University College of Forestry at Syracuse University, 1964

**Floyd E. Carlson** (1930)
*Professor, Forest Extension*
B.S.F., University of Washington, 1928; M.F., 1930

**Neils B. Christiansen** (1960)
*Assistant Professor of Forest Economics*
B.S., University of Idaho, 1957; M.S., State University College of Forestry at Syracuse University, 1959; Ph.D., 1966

**Rolla W. Cochran** (1964)
*Associate Professor, Forest Extension; Public Relations Officer*
B.A., Denison University, 1949; M.S., Ohio State University, 1951

**Wilfred A. Côté, Jr.** (1950)
*Professor of Wood Technology*
B.S., University of Maine, 1949; M.F., Duke University, 1950; Ph.D., State University College of Forestry at Syracuse University, 1958

**Raymond F. Crossman** (1942)
*Professor of English; Director of Student Services; Dean of Students*
A.B., Syracuse University, 1926; M.A., 1931

**George W. Curry** (1966)
*Instructor in Landscape Architecture*
B.A., Michigan State University, 1962; B.S., 1965; M.L.A., University of Illinois, 1967

**Robert W. Davidson** (1957)
*Associate Professor of Wood Products Engineering*
B.S., Montana State University, 1948; M.S., State University College of Forestry at Syracuse University, 1956; Ph.D., 1960

**Russell C. Deckert** (1952)
*Associate Professor, Wood Products Extension; Wood Utilization Team*
B.S.F., University of Georgia, 1938; M.F., Duke University, 1943

**Carlton W. Dence** (1951)
*Associate Professor, Pulp and Paper Research*
B.S., Syracuse University, 1947; M.S., State University of New York College of Forestry, 1949; Ph.D., 1959

**Carl H. deZeeuw** (1946)
*Professor of Wood Products Engineering*
A.B., Michigan State College, 1934; B.S., 1937; M.S., New York State College of Forestry, 1939; Ph.D., State University of New York College of Forestry, 1949

**Daniel L. Dindal** (1966)
*Assistant Professor of Forest Zoology*
B.S., Ohio State University, 1958; M.A., 1961; Ph.D., 1966

**William A. Duerr** (1952)
*Professor of Forestry Economics; Chairman of Department*
B.S., Iowa State College, 1934; M.S., University of Minnesota, 1939; A.M., Harvard University, 1941; Ph.D., 1944

**George F. Earle** (1952)
*Professor of Art*
B.F.A., Syracuse University, 1937; M.F.A., Yale University, 1946

**Herbert E. Echelberger** (1966)
*Adjunct Assistant Professor, Forest Management*
B.S., Southern Illinois University, 1965; M.S., 1966

**John H. Engelken** (1959)
*Assistant Professor of Forestry; Manager, Svend Oluf Heiberg Memorial Forest*
B.S.F., Utah State University, 1950

**Arthur R. Eschner** (1961)
*Associate Professor of Forest Influences*
B.S., New York State College of Forestry, 1950; M.S., Iowa State College, 1952; Ph.D., State University College of Forestry at Syracuse University, 1965

C. Eugene Farnsworth (1930)
*Professor of Silviculture; Chairman of Department; Acting Director of State University Water Resources Center*
B.S.F., Iowa State College, 1926; M.F., Yale University, 1928; Ph.D., University of Michigan, 1945

Claude C. Freeman (1959)
*Instructor in Landscape Architecture*
B.S., State University College of Forestry at Syracuse University, 1959

Robert I. Gara (1966)
*Assistant Professor of Forest Entomology*
B.S., Utah State University, 1953; M.S., Oregon State University, 1962; Ph.D., 1964

Gerald M. Garthe (1967)
*Instructor in World Forestry*
B.S., University of Idaho, 1961; M.F., North Carolina State University, 1965

Russell E. Getty (1966)
*Professor of Forest Management; Chairman of Department*
B.S., Iowa State College, 1936; M.S., 1951

Serge N. Gorbatsevich (1956)
*Associate Professor of Pulp and Paper Technology*
B.S., State University of New York College of Forestry, 1954; M.S., 1955

Paul F. Graves (1947)
*Professor of Forest Administration; Associate Dean, Resource Management, College Forests, and Extension*
B.S., New York State College of Forestry, 1939; M.F., 1941; Ph.D., Syracuse University, 1950

Willam E. Graves (1967)
*Assistant Professor of Forest Zoology*
B.S., University of Massachusetts, 1963; M.S., University of Wisconsin, 1965; Ph. D., University of Wisconsin, 1967

Harry M. Gray (1961)
*Adjunct Professor, Pulp and Paper Technology*
B.S., Davis and Elkins College, 1923; D.Sc., 1945

Donald F. Green (1965)
*Assistant Professor of Mathematics; Registrar*
A.B., New York State College for Teachers, 1942; M.S., 1950

George H. Haines (1953)
*Director of Business Affairs*
B.S., University of Rhode Island, 1932

David L. Hanselman (1963)
*Coordinator of Audio Visual Services*
B.S., Cornell University, 1957; M.S., 1958; Ph.D., Ohio State University, 1963

Roy C. Hartenstein (1959-1965, 1967)
*Associate Professor of Forest Zoology*
B.S., State Teachers College at Buffalo, 1953; M.S., Syracuse University, 1957; Ph.D., State University College of Forestry at Syracuse University, 1959

Lee P. Herrington (1965)
*Assistant Professor of Meteorology*
B.S., University of Maine, 1959; M.F., Yale University, 1960; Ph.D., 1964

Allen F. Horn, Jr. (1957)
*Associate Professor of Forest Management*
B.S., Michigan State University, 1950; M.S., 1951; Ph.D., State University College of Forestry at Syracuse University, 1957

**Terence J. Hoverter** (1960)
*Librarian and Professor*
A.B., Fordham University, 1937; B.S., Columbia University, 1939; M.A., Fordham University, 1954

**Joseph Jagur** (1966)
*Associate Professor, Polymer Research*
C.E., Lodz Institute of Technology, 1949; M.Sc., 1949; Ph.D., Hebrew University, 1962

**Edwin C. Jahn** (1938)
*Professor of Forest Chemistry; Executive Dean; Acting Dean*
B.S., New York State College of Forestry, 1925; M.S., 1926; Ph.D., McGill University, 1929

**Ronald R. Karns** (1965)
*Instructor, Forest Extension; Editor*
B.S., Ohio State University, 1954

**Joseph D. Kasile** (1965)
*Assistant Professor of Forest Management*
B.S., Iowa State University, 1959; M.S., Oregon State University, 1960

**Edwin H. Ketchledge** (1955)
*Professor of Forest Botany*
B.S., State University of New York College of Forestry, 1949; M.S., 1950; Ph.D., Stanford University. 1957

**Donald E. Koten** (1961)
*Associate Professor of Forest Management*
B.A., North Central College, 1951; B.S., Oregon State College, 1957; Ph.D., State University College of Forestry at Syracuse University, 1966

**Jack L. Krall** (1947)
*Professor of Forest Entomology*
B.S., New York State College of Forestry, 1939; M.S., Iowa State College, 1942; Ph.D., 1950

**Frank E. Kurczewski** (1966)
*Assistant Professor of Forest Entomology*
B.S., Allegheny College, 1958; M.S., Cornell University, 1962; Ph.D., 1964

**George H. Kyanka** (1967)
*Assistant Professor of Wood Products Engineering*
B.S., Syracuse University, 1962; M.S., Syracuse University, 1966

**Robert T. LaLonde** (1959)
*Associate Professor of Forest Chemistry*
B.A., St. John's University, 1953; Ph.D., University of Colorado, 1957

**Richard W. Lalor** (1953)
*Associate Professor of English*
B.S., New York State College for Teachers, Albany, 1941; A.M., Cornell University, 1946

**Arnold H. Lanckton** (1967)
*Assistant Professor of Engineering*
B.S., State University College of Forestry at Syracuse University, 1961; M.S., State University College of Forestry at Syracuse University, 1962

**Wilbur F. LaPage** (1966)
*Adjunct Instructor, Forest Management*
B.S., University of New Hampshire, 1959; M.S., 1962

**Charles C. Larson** (1950)
*Professor of World Forestry; Director, World Forestry Institute*
A.S., North Dakota State School of Forestry, 1938; B.S., University of Minnesota, 1940; M.S., University of Vermont, 1943; Ph.D., State University of New York College of Forestry, 1952

**Albert L. Leaf** (1957)
*Professor of Silviculture*
B.S.F., University of Washington, 1950; M.F., 1952; Ph.D., University of Wisconsin, 1957

**Charles N. Lee** (1959)
*Associate Professor of Forest Engineering; Director of Computer Center*
B.S., New York State College of Forestry at Syracuse University, 1949; B.C.E., Syracuse University, 1957; M.C.E., 1959

**Raymond E. Leonard** (1964)
*Adjunct Instructor in Watershed Management*
B.S., University of Vermont, 1955; M.M.M., University of Helsinki, 1957; M.F., Yale University, 1964

**Bengt Leopold** (1961)
*Professor of Pulp and Paper Technology; Director, Empire State Paper Research Institute*
Civiling., Royal Institute of Technology, Stockholm, 1947; Tekn. lic., 1949; Ph.D., 1952

**Josiah L. Lowe** (1933)
*Research Professor of Mycology*
B.Sc., New York State College of Forestry, 1927; Ph.D., University of Michigan, 1938

**Philip Luner** (1957)
*Associate Professor, Pulp and Paper Research*
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**Paul D. Manion** (1967)
*Assistant Professor of Forest Botany*
B.S., University of Minnesota, 1962; M.S., University of Minnesota, 1965

**Frank L. Maraviglia** (1964)
*Assistant Professor of Landscape Architecture*
B.S., College of Education, Oswego, 1958; M.S., Hofstra University, 1963

[1]**Robert H. Marchessault** (1961)
*Professor of Physical and Polymer Chemistry*
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**Renata Marton** (1957)
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Master Ph. (Chemistry), Jagiello University, 1934; Ph.D., 1936

**Larry L. McDowell** (1964)
*Professional Research Associate, Forest Botany*
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**John A. Meyer** (1953)
*Associate Professor, Nuclear Chemistry Research*
B.S., Pennsylvania State College, 1949; M.S., 1950; Ph.D., State University College of Forestry at Syracuse University, 1958

**Charles R. Miller** (1966)
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B.S., State University College of Forestry, 1958; M.F., Duke University, 1961; Ph.D., Michigan State University, 1966

**Howard C. Miller** (1950)
*Associate Professor, Entomology Extension*
B.S., New York State College of Forestry, 1941; Ph.D., Cornell University, 1951

**Raymond A. Moore** (1954)
*Assistant Professor, Wood Products Engineering Research*
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[1] Sabbatic Leave 7/1/67-6/30/68

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DAVID G. PALMER (1966)
*Assistant Professor of Industrial Engineering*
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EARL F. PATRIC (1952)
*Professor of Forest Zoology*
B.S., University of Connecticut, 1950; M.S., State University of New York College of Forestry, 1952; Ph.D., State University College of Forestry at Syracuse University, 1958

HARRISON H. PAYNE (1964)
*Associate Professor of Forest Zoology; Assistant Director of Student Services*
B.S., State University College of Forestry at Syracuse University, 1950; M.Ed., St. Lawrence University, 1955; Ed.D., Cornell University, 1963

JAMES M. PEARSON (1966)
*Assistant Professor, Polymer Research*
B.Sc., Aberdeen University, 1959; Ph.D., 1962

RICHARD E. PENTONEY (1953)
*Professor of Wood Products Engineering; Research Coordinator; Acting Director for Physical Sciences and Research*
B.S., University of California, 1949; M.S., State University of New York College of Forestry, 1952; Ph.D., 1956

SHELLEY W. POTTER, JR. (1956)
*Assistant Professor of Forestry; Manager, Pack Demonstration Forest*
New York State Ranger School, 1947; B.S., University of Michigan, 1951

EDWARD O. PRICE (1966)
*Assistant Professor of Forest Zoology*
B.A., The College of Wooster, 1960; M.S., Michigan State University, 1963; Ph.D., 1966

ROBERT G. REIMANN (1962)
*Associate Professor of Landscape Architecture*
B.S., State University College of Forestry at Syracuse University, 1954

SAMUEL ROTHENBERG (1946)
*Professional Research Associate, Pulp and Paper Technology*
B.S., New York State College of Forestry, 1943; M.S., State University College of Forestry, 1964

ANATOLE SARKO (1967)
*Assistant Professor, Polymer Research*
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HERBERT R. SCHAAL (1966)
*Instructor in Landscape Architecture*
B.S., California State Polytechnic College, 1962

MICHAIL SCHAEDLE (1965)
*Assistant Professor of Forest Botany*
B.S., University of British Columbia, 1957; M.S., 1959; Ph.D., University of California, 1964

CONRAD SCHUERCH (1949)
*Professor of Forest Chemistry; Chairman of Department*
B.S., Massachusetts Institute of Technology, 1940; Ph.D., 1947

**Bradford G. Sears** (1941)
*Professor of Landscape Architecture*
B.S., New York State College of Forestry, 1939; M.S., State University of New York College of Forestry, 1948

**Elwood L. Shafer, Jr.** (1962)
*Adjunct Assistant Professor of Forest Management*
B.S., Pennsylvania State University, 1956; M.F., 1957; Ph.D., State University College of Forestry at Syracuse University, 1966

**John F. Siau** (1963-1964, 1965, 1966)
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**Savel B. Silverborg** (1947)
*Professor of Forest Pathology*
B.S., University of Idaho, 1936; Ph.D., University of Minnesota, 1948

**John B. Simeone** (1948)
*Professor of Forest Entomology; Chairman of Department*
B.S., Rhode Island State College, 1942; M.F., Yale University, 1948; Ph.D., Cornell University, 1960

**Christen Skaar** (1946-1948, 1949)
*Professor of Wood Products Engineering*
B.S., New York State College of Forestry, 1943; M.S., State University of New York College of Forestry, 1948; Ph.D., Yale University, 1957

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*Associate Professor, Polymer Chemistry Research*
B.Sc., Free University, 1952; M.Sc., 1954; Ph.D., State University College of Forestry at Syracuse University, 1957

**Gerald H. Smith** (1946)
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**Leonard A. Smith** (1964)
*Professional Research Associate, Wood Products Engineering*
B.S., Ch.E., University of Dayton, 1962; M.S., Ch.E., Case Institute of Technology, 1964

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*Professor of Biochemistry*
B.Sc., City College of New York, 1946; Ph.D., Cornell University, 1952

**Gerald R. Stairs** (1963)
*Associate Professor of Silviculture*
B.S., Washington State University, 1958; M.F., Yale University, 1960; Ph.D., 1963

**Bruce T. Stanton** (1946)
*Professor of Forest Management*
New York State Ranger School, 1927; B.S., New York State College of Forestry, 1940; M.F., 1942

**Theodore J. Stenuf** (1960)
*Associate Professor of Pulp and Paper Technology*
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**Roger W. Strauss** (1955-1960, 1966)
*Associate Professor of Pulp and Paper Technology*
B.S., New York State College of Forestry, 1949; M.S., 1950; Ph.D., 1961

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*Associate Professor of English*
A.B., Oberlin College, 1934; M.A., Bryn Mawr, 1937; Ph.D., 1942

MICHAEL M. SZWARC (1952)
*Distinguished Professor of Chemistry; Director of State University Polymer Research Center*
Ch.E., Polytechnika Warzawska, 1932; Ph.D., (Organic Chemistry), Hebrew University, Jerusalem, 1942; Ph.D., (Physical Chemistry), University of Manchester, 1947; D.Sc., 1949

HERBERT TEPPER (1962)
*Professor of Forest Botany; Chairman of Department*
B.S., State University College of Forestry at Syracuse University, 1953; M.S., 1958; Ph.D., University of California, 1962

WILLIAM C. TIERSON (1961)
*Forest Manager, Archer and Anna Huntington Forest*
B.S., New York State College of Forestry, 1949

TORE E. TIMELL (1962)
*Professor of Forest Chemistry; Director, Cellulose Research Institute*
Civiling., Royal Institute of Technology, Stockholm, 1946; Tekn. lic., 1948; Ph.D., 1950

WILLIAM P. TULLY (1966)
*Assistant Professor of Civil Engineering*
B.S., Northeastern University, 1964; M.S., 1966

FREDRICK A. VALENTINE (1956)
*Associate Professor of Forest Botany*
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*Associate Professor of Landscape Architecture*
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DANIEL C. WALTON (1963)
*Assistant Professor of Biochemistry*
B.Ch.E., University of Delaware, 1955; Ph.D., State University College of Forestry at Syracuse University, 1962

CHUN-JUAN WANG (1959)
*Associate Professor of Forest Botany*
B.S., Taiwan University, 1950; M.S., Vassar College, 1953; Ph.D., State University of Iowa, 1955

WILLIAM L. WEBB (1937)
*Professor of Forest Zoology; Director of Graduate Studies*
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FAY WELCH (1932)
*Lecturer in Forest Recreation*
B.S., New York State College of Forestry, 1922

WILEY D. WENGER, JR. (1965)
*Instructor in Forest Management*
B.S., Oregon State University, 1957; M.S., State University College of Forestry at Syracuse University, 1960

ROBERT G. WERNER (1966)
*Assistant Professor of Forest Zoology*
B.S., Purdue University, 1958; M.A., University of California (LA) 1963; Ph.D., Indiana University, 1966

JAMES C. WHITTAKER (1966)
*Adjunct Assistant Professor, Forest Management*
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HUGH E. WILCOX (1951)
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[2] Sabbatic Leave 7/16/67–1/15/68

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Robert A. Zabel (1947)
*Professor of Forest Botany; Associate Dean for Biological Sciences and Instruction*
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## RANGER SCHOOL FACULTY

Jean E. Fisher (1963)
*Director; Professor of Forestry*
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*Associate Professor of Forestry*
New York State Ranger School, 1950; B.S.F., University of Michigan, 1952; M.F., State University College of Forestry at Syracuse University, 1957

James E. Coufal (1965)
*Assistant Professor of Forestry*
B.S., State University College of Forestry at Syracuse University, 1960; M.S., 1962

Philip J. Haddock (1929)
*Assistant Professor of Forestry*
New York State Ranger School, 1926

Charles E. Martin II (1962)
*Assistant Professor of Forestry*
B.S., Duke University, 1953; M.F., 1954

Richard W. Miller (1966)
*Instructor in Forestry*
B.S., State University College of Forestry, 1956

Kermit E. Remele (1962)
*Instructor in Forestry*
New York State Ranger School, 1943; B.S., State University College of Forestry, 1949; M.F., University of Michigan, 1952

## SUPPORTING PROFESSIONAL STAFF

*John V. Berglund (1965)
*Professional Research Assistant, Silviculture*
B.S., Pennsylvania State University, 1962; M.S., 1964

*Hugh O. Canham (1966)
*Professional Research Assistant, Forestry Economics*
B.S., State University College of Forestry at Syracuse University, 1960; M.S., 1962

Rhondda K. Cassetta (1967)
*Associate for Institutional Research*
A.B., Elmira College, 1933

Gabriele E. Cope (1965)
*Associate Librarian*
M.S. in L.S., Syracuse University, 1965

Harry J. Corr (1967)
*Assistant Director of Business Affairs*
B.S., Siena College, 1957

Clay M. Crosby (1964)
*Research Assistant, Pulp and Paper Technology*
B.S., State University of New York College of Forestry, 1964

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*Director of Admissions*
A.B., Syracuse University, 1952; M.A., 1954

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*Research Assistant, Forest Chemistry*
B.S., Queens College, 1949; M.S., Syracuse University, 1965

*HAZEL S. JENNISON (1965)
*Professional Research Assistant, Forest Chemistry*
B.S., Western Kentucky State College, 1941

BERTRAM H. KNOUSE (1967)
*Assistant Librarian*
B.S., University of Pennsylvania, 1950; M.L.S., State University of New York at Geneseo, 1965

J. DONALD MABIE (1967)
*Assistant to Dean (for Research)*
B.S., State University of New York at Albany, 1961

WALTER A. MAIER (1963)
*Research Assistant, Wood Products Engineering*
B.S., State University College of Forestry at Syracuse University, 1960

*GEORGE F. MATTFELD (1965)
*Professional Research Assistant, Forest Zoology*
B.S., State University College of Forestry, 1962; M.S., University of Michigan, 1964

JOHN E. MILAVEC (1965)
*Associate Director of Admissions*
B.S., College of Education at Cortland, 1960; M.S., College of Education at Albany, 1961

JAMES O. MOORE (1965)
*Manager, Computer Center*
B.M.E., Rensselaer Polytechnic Institute, 1960

RALPH D. NYLAND (1967)
*Research Associate, Applied Forestry Institute*
B.S., State University College of Forestry at Syracuse University, 1958; M.S. State University College of Forestry at Syracuse University, 1959; Ph.D., Michigan State University, 1966

EMIEL D. PALMER (1962)
*Research Assistant, Physical Sciences*
A.B., Syracuse University, 1928

ANNE L. REESE (1965)
*Programmer-Analyst, Computer Center*

JOHN R. REEVES (1966)
*Student Financial Aids Officer*
B.S., State University of New York at Cortland, 1960; M.S., Syracuse University, 1964

*NORMAN A. RICHARDS (1963)
*Professional Research Assistant, Silviculture*
B.S., State University College of Forestry at Syracuse University, 1957; M.S., Cornell University, 1959

FAY RUMSEY (1961)
*Technical Assistant, Forestry Economics*

JAMES L. THORPE (1965)
*Research Assistant, Pulp and Paper Technology*
B.S., State University College of Forestry, 1965

*Qualified Academic Rank

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# STATE UNIVERSITY OF NEW YORK

Office of the Chancellor, 8 Thurlow Terrace, Albany, N.Y. 12201

## UNIVERSITY CENTERS

State University at Albany
State University at Binghamton
State University at Buffalo
State University at Stony Brook

## MEDICAL CENTERS

Downstate Medical Center at Brooklyn (New York City)
Upstate Medical Center at Syracuse

## COLLEGES OF ARTS AND SCIENCE

College at Brockport
College at Buffalo
College at Cortland
College at Fredonia
College at Geneseo
College at New Paltz
College at Oneonta
College at Oswego
College at Plattsburgh
College at Potsdam

(Three additional Colleges of Arts and Science are under development. Two four-year campuses, in Westchester and Nassau Counties, are in early planning. A third, upper-divisional in nature, has been proposed for the Utica-Rome-Herkimer Area.)

## SPECIALIZED COLLEGES

College of Forestry at Syracuse
Maritime College at Fort Schuyler (Bronx)
College of Ceramics at Alfred University
College of Agriculture at Cornell University
College of Home Economics at Cornell University
School of Industrial and Labor Relations at Cornell University
Veterinary College at Cornell University

## AGRICULTURAL AND TECHNICAL COLLEGES

*(Two-year)*

Agriculture and Technical Colleges at:
Alfred
Canton
Cobleskill
Delhi
Farmingdale
Morrisville

## COMMUNITY COLLEGES

*(Locally-sponsored two-year colleges under the program of State University)*

Adirondack Community College at Hudson Falls
Auburn Community College at Auburn
Borough of Manhattan Community College at New York City
Bronx Community College at New York City
Broome Technical Community College at Binghamton
Corning Community College at Corning
Dutchess Community College at Poughkeepsie
Erie County Technical Institute at Buffalo
Fashion Institute of Technology at New York City
Fulton-Montgomery Community College at Johnstown
Hudson Valley Community College at Troy
Jamestown Community College at Jamestown
Jefferson Community College at Watertown
Kingsborough Community College at Brooklyn
Mohawk Valley Community College at Utica
Monroe Community College at Rochester
Nassau Community College at Garden City
New York City Community College of Applied Arts and Sciences at Brooklyn
Niagara County Community College at Niagara Falls
Onondaga Community College at Syracuse
Orange County Community College at Middletown
Queensborough Community College at New York City
Rockland Community College at Suffern
Staten Island Community College at New York City
Suffolk County Community College at Selden
Sullivan County Community College at South Fallsburg
Ulster County Community College at Kingston
Westchester Community College at Valhalla

(Seven additional community colleges, to be located in Clinton, Columbia-Greene, Cortland-Tompkins, Essex-Franklin, Genesee, Herkimer and Ontario Counties, have been approved by the Board of Trustees.)

STATE UNIVERSITY OF NEW YORK
LET EACH BECOME ALL HE IS CAPABLE OF BEING
1948

# COLLEGE
# OF
# FORESTRY
# CATALOG
# 1969-1970

TATE UNIVERSITY OF NEW YORK

# STATE UNIVERSITY OF NEW YORK

The State University of New York, established by the State Legislature in 1948, comprises 70 colleges and centers. At present, 63 conduct classes: four University Centers, two Medical Centers, 11 Colleges of Arts and Science, two Specialized Colleges, six two-year Agricultural and Technical Colleges, five Statutory Colleges, and 33 locally-sponsored, two-year Community Colleges.

Three Colleges of Arts and Science are in varying stages of development. Two four-year campuses, in Westchester County at Purchase and in Nassau County at Old Westbury are under construction. Old Westbury admitted a limited number of students in September, 1968, in temporary quarters at Oyster Bay, Long Island. The third campus will be upper-divisional (junior-senior years) in concept and located in the Utica-Rome-Herkimer area. Master's level programs will be offered at all three campuses.

The University's Trustees also have approved the establishment of five additional Community Colleges. In varying stages of development, they are sponsored by Clinton, Columbia-Greene, and Schenectady Counties and two by New York City's Board of Higher Education.

The University further comprises the Ranger School, a division of the College of Forestry, which offers a 43-week technical forestry program at Wanakena; the Center for International Studies and World Affairs at Albany; and four Urban Centers administered by Community Colleges.

University-wide research programs include the Atmospheric Sciences Research Center with campus headquarters at Albany, the Institute for Theoretical Physics and the Marine Sciences Research Center at Stony Brook, and the Water Resources and Polymer Research Centers at the College of Forestry. Two research facilities headquartered at State University of New York at Buffalo are the Western New York Nuclear Research Center and the Center for Immunology.

Graduate study at the doctoral level is offered by State University at 12 of its campuses, and graduate work at the master's level at 22. The University is continuing to broaden and expand over-all opportunities for advance degree study.

Graduate study areas embrace a wide spectrum including agriculture, business administration, criminal justice, dentistry, education, engineering, forestry, law, liberal arts and science, library science, medicine, nursing, pharmacy, social work, and veterinary medicine.

Four-year programs strongly emphasize the liberal arts and science and also include specializations in teacher education, business, radio and television, forestry, maritime service, ceramics, pre-law, and the fine and performing arts.

Two-year programs include nursing and liberal arts transfer programs and a wide variety of technical curriculums such as agriculture, business, and the industrial and medical technologies.

The University's Urban Centers provide training for skilled and semi-skilled occupations and college foundation courses for youths in the inner city areas.

Governed by a Board of Trustees appointed by the Governor, State University of New York comprises all State-supported institutions of higher education, with the exception of the senior colleges of City University of New York. Each college and center of State University is locally administered. Although separated geographically, all are united in the purpose of improving and extending numerous opportunities to the youth of New York State.

The State University motto is "Let Each Become All He Is Capable of Being."

## ACCREDITATION

STATE UNIVERSITY OF NEW YORK is accredited by the Middle States Association of Colleges and Secondary Schools. The College of Forestry is also accredited by the Society of American Foresters. The School of Landscape Architecture is accredited by the national professional organization, The American Society of Landscape Architects.

# 1969-1970
# GENERAL CATALOG

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STATE UNIVERSITY
COLLEGE OF FORESTRY
AT SYRACUSE UNIVERSITY

## STATE UNIVERSITY OF NEW YORK

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# ACADEMIC CALENDAR

### *First Semester, 1969–70*

| | |
|---|---|
| Dormitories Open | September 7 (8 a.m.) |
| Registration | September 9–12 |
| Classes Begin | September 15 (8 a.m.) |
| Middle of Term | November 8 |
| Thanksgiving Weekend | November 26 (12 m.)–December 1 (8 a.m.) |
| Christmas Recess | December 20 (12 m.)–January 5 (8 a.m.) |
| Last Day of Classes | January 17 |
| Final Examinations | January 19–30 |

### *Second Semester, 1969–70*

| | |
|---|---|
| Registration | February 2–4 |
| Classes Begin | February 5 |
| Middle of Term | March 28 |
| Spring Recess | March 27 (12 m.)–April 6 (8 a.m.) |
| Last Day of Classes | May 23 |
| Final Examinations | May 25–June 3 |
| Commencement | June 6 |

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# I

# THE COLLEGE GOALS

One-third of the land area of the United States is forested, and in many other countries, especially those just now developing industrial societies, the percentage is much higher. Efficient and wise use of forests, and related natural resources, requires an ever-growing number of scientists, engineers, managers and planners sensitive to social needs. The development, manufacture, and use of forest products and materials continue to accelerate in today's expanding technology. Creating a functional, pleasing, livable environment for man becomes increasingly important as population pressures build. It is a College goal to educate students in a wide spectrum of disciplines to fill professional positions in these fields, and to instill in these graduates a knowledge of their role and application in human affairs.

Research, the seeking of new facts, is a corollary of education, and is another major College goal. Research is a vital scholarly activity of the faculty, and helps provide a strong teaching base for undergraduate as well as graduate students.

Public service, the third major goal, has a history as old as the College itself. Using the same broad concept of forestry as is found in the classrooms, public education efforts range from the individual to mass audiences.

To accomplish these goals the College seeks capable, dedicated students who desire to acquire knowledge and to use this knowledge to assume responsible and creative positions in society.

It seeks to improve the environment for learning and research by providing modern, well-equipped classrooms, laboratories, and library facilities. It continually seeks to enhance the already distinguished faculty and supporting staff. It seeks to improve curriculums to meet changing science, engineering and social requirements.

The College strives to find more effective ways to reach the public, in order to be of greater service to individuals, industries, and all levels of government. And it strives to continue its role of leadership in natural resources higher education.

# II

# THE COLLEGE ESTABLISHMENT

The College of Forestry was founded as a State College in 1911, and became a unit of the State University of New York when it was created by the Legislature in 1948. The central administrative offices of State University are in Albany. The President is the chief executive officer of the College, and is governed by policies established by the College of Forestry Trustees and the State University Trustees. Because of the cooperative relationship with Syracuse University, a close liaison is maintained with the Chancellor and other administrative officers.

## ENVIRONMENT

The campus of the College adjoins that of Syracuse University on one of the hills which surround and overlook metropolitan Syracuse. The city, near the geographical center of New York, is the core of an urban and industrial region of nearly 450,000 population. Numerous manufacturing firms apply modern technology in electrical, chemical, mechanical, metallurgical, and biological fields. Major highways, and rail, air, and bus lines, intersect at Syracuse.

Both the City of Syracuse and Syracuse University offer varied cultural and recreational opportunities, including exhibitions of paintings and sculpture, recitals and concerts, amateur and professional theater, dance and cinema, lectures in the humanities, forums and addresses by political and social scientists. The annual Arts Festival is among the special attractions of the campus.

Among the city's cultural assets are the Syracuse Symphony Orchestra and the Everson Museum of Arts of Syracuse and Onondaga County, both with a fine philosophy of community service and participation.

Recreation opportunities are varied because of the central New York climate and geography. General facilities for winter and summer sports are enjoyed by residents and students. The City of Syracuse and Onondaga County have extensive park systems, and State Parks are nearby. The Finger Lakes Region begins 18 miles away, and the Thousand Islands are 90 miles from Syracuse. The Adirondack and Catskill Mountain Parks and Niagara Falls are within 150 miles.

## CAMPUS

Bray Hall, Marshall Memorial Building, Baker Memorial Wood Products Laboratory, Illick Hall, Moon Memorial Library, and the new Walters Hall are the principal buildings.

Off-campus facilities include nearly 22,000 acres of forest land at six locations used for instruction, demonstration, and research. A tree nursery and small arboretum are included in the total. At the Huntington Wildlife Forest Station in the Central Adirondack Mountains, a Forest Wildlife Research Laboratory is in final planning stages. A complete sawmill operation is carried out at the Pack Demonstration Forest, near Warrensburg.

On the campus are the following institutes and centers: Cellulose Research Institute, Empire State Paper Research Institute, State University Polymer Research Institute, State University Water Resources Center, Office of International Forestry, and the Applied Forestry Research Institute. A work center of the U. S. Forest Service and the Roosevelt Wildlife Experiment Station are also at the College.

The College is extensively furnished with modern equipment and instruments for instruction and research in its major subject areas. These include electron microscopes, plant growth chambers, air conditioned greenhouses, an animal environmental simulating chamber, a bio-acoustical laboratory, a 1,000-curie cobalt-60 radiation source, radioisotopes laboratories, computer center, and specialized instrumentation including nuclear magnetic resonance, electron spin resonance, mass spectrometer, ultracentrifuge, x-ray and infra-red spectrophotometer. Photogrammetric and geodetic facilities include one of the most extensive arrays of equipment in the U. S., with a Nistri TA-3 stereocomparator, Mann comparator, computerized Nistri photocartograph, and nine other varieties of plotters. The paper science and engineering laboratory has a semi-commercial paper mill with accessory equipment. The greenhouses and forest insectary are used to produce plant and insect material for classroom and laboratory. Extensive collections are available for study, including wood samples from all over the world, botanical materials, insects, birds, mammals, and fishes.

## PROFESSIONAL EDUCATION

The College provides instruction for professional work in seven, four-year curriculums, some of which contain optional programs. Each leads to the Bachelor of Science degree, or in the case of one, to the Bachelor of Landscape Architecture degree. Most undergraduates enter at the Freshman level, but the number of transfer students entering at the Sophomore and Junior levels is increasing.

Graduate study, leading to the Master's degree and Doctor of Philosophy degree, began when the College was founded. The first advanced degree was awarded in 1913. Since then graduate enrollment has increased steadily and averages 20 per cent of the registration. More than 1,000 advanced degrees have been awarded by the College. Graduate students choose among many fields of forestry, forest products, and their supporting science disciplines for their work toward a degree. Each year the College awards a number of scholarships, fellowships, and assistantships to degree candidates. (See page 67 for Graduate Study.)

## TECHNICAL EDUCATION

The College has been training men for technical forestry work since 1912 at the Ranger School at Wanakena, N. Y. It is situated on 2,680 acres on Cranberry Lake in the Adirondack Mountains. The school offers a terminal one-year course which prepares men for a variety of technical forestry jobs. Additional information can be obtained from the Director, New York State Ranger School, Wanakena, New York.

## PUBLIC EDUCATION

The College serves the public through its Office of Public Service and Continuing Education with public education a responsibility of all faculty members. The Office coordinates efforts to provide information, advice and guidance to specialized local, state and federal agencies, to the forest and wood-using industries, and to the general public on matters relating to the conservation and use of New York's forest resources.

Continuing education programs are designed to serve needs in three broad areas: refresher programs to up-date professionals at various levels of responsibility; more comprehensive programs of an interdisciplinary nature to improve decision-making premises for resource managerial and supervisory personnel; and informational programs aimed at better recognition of basic relationships and impacts between land, resources, and society, for lay and community leaders involved in planning and stewardship.

Various media and programs are used for off-campus public service endeavors. These include a Wood Utilization Team, a State Technical Services project for wood-using industries, a motion-picture film library with supporting production facilities, and a wide range of publications, both technical and popular, on forestry topics.

In addition, mass communications techniques are used to reach the public with certain types of information, including radio and television, exhibits, speakers bureau, tours, newspapers, magazines, and trade journals.

Requests for public education services should be sent to: Director, Office of Public Service and Continuing Education, College of Forestry, Syracuse, N. Y. 13210.

## RESEARCH

Research is one of the prime endeavors of the College, and is of greatest interest to entering graduate students. But the seeking of new knowledge contributes to the academic enterprise throughout the College. Instruction, public education, and research are mutually beneficial at a professional institution, and it has been through these channels that the College has achieved its well-rounded and balanced program.

## STUDENTS AND FACULTY

Education in the classroom, laboratory, and field is a cooperative endeavor between students and faculty, and is an enriching experience for both. This two-way communication is traditional at the College, so much so that Deans and Department Chairmen, with considerable administrative responsibilities, still meet classes and consider it a privilege to do so.

Men and women are accepted as students at the College, and at present number 1,392. Of these 1,127 are undergraduates and 265 are graduate students. In addition there are 27 post doctorates. A growing number of students at the College transfer here from community colleges and other institutions. Transfers can be effected in February as well as September. International students, both undergraduate and graduate, are encouraged to apply for admission. For detailed information on procedures refer to How To Apply For Admission on page 31, and Graduate Study on page 67.

The teaching and research staff of the College is comprised of 155 faculty. Selected professors are designed as graduate faculty, but they also teach undergraduate courses and are available for undergraduate consultations. Many of them serve as advisors to undergraduates which is particularly helpful to students seeking advanced degrees.

## LIBRARY

The Franklin F. Moon Memorial Library contains more than 83,000 catalogued books and pamphlets, and receives more than 640 current journals and society publications. Besides containing one of the three largest collections in the U. S. in the field of forestry, the Library is now developing strong holdings in the fields of pulp and paper technology, the basic biological sciences, polymers, and landscape architecture. Through the Robin Hood Collection the Library offers a carefully selected and broad choice of non-professional reading of general interest.

The Library subscribes to the usual abstracting and indexing services to be found in most scientific libraries as well as to services peculiar to the specializations of the College.

Interlibrary loan privileges with institutions throughout the U. S. and Canada are extended to qualified researchers. Accessible to faculty and students are the diversified resources of the libraries of Syracuse University, the State University Upstate Medical Center, the Syracuse Public Library, and the special scientific libraries of industrial companies located in the Syracuse area.

## III

## YOU AND THE COLLEGE

How can you best prepare for a professional career and a lifetime that will last well into the 21st century? This is the question facing you, a high school graduate, as you consider a college education. While the future is full of uncertainty and challenge, you can be sure that the role of the scientist, the engineer, the manager, and the landscape architect will expand during the years ahead.

Forestry as generally understood means the wise, continuous use of forests and their products for human benefit. Managing forest resources for optimum yields of timber and wood products, plentiful supplies of water, and abundance of wildlife, natural beauty, attractive recreational environments, and other services and products is a major responsibility of foresters.

Forest products industries, including wood processing, wood products manufacturing and retailing, pulp and paper, and the cellulosic products, rank high in the nation's economy. All require many wood products engineers, wood merchandisers, and pulp and paper specialists to design and direct their operations, to merchandise their products, and to conduct developmental and basic research. Broad opportunities in the synthetic fiber, film, lacquer, plastics, dissolving pulp and other cellulosic and polymer industries are available for chemists with training in wood and polymer chemistry.

Biological sciences serve a vital function to both forestry and forest products, and special curriculums have been developed at the College that recognize these relationships.

Landscape architecture is a profession that deals with the development of land areas for both aesthetic and functional purposes. In recent years it has assumed great importance in the fields of land use planning and recreation.

The demand for men and women specializing in forestry and associated resources, forest products and materials, and landscape architecture, exceeds the supply. Since you are considering the College of Forestry, we can assume that you have already decided on a science oriented education. But it may be helpful to you if we briefly explain the major fields of specialization available at the College. More detailed information on curriculum is found beginning on page 35.

## FOREST BIOLOGY

The forest biology curriculum provides a basic education in biology, presenting and integrating modern concepts in the molecular, cellular, organismal, and environmental areas of biology. It places emphasis on forest organisms, the forest environment, and provides an orientation to forestry principles. The curriculum primarily prepares students for graduate study in biological areas basic to understanding and using renewable natural resources, such as botany, forest pathology, forest entomology, silviculture, wildlife biology, or zoology. It also qualifies students for a broad range of federal, state, and private biology positions related to natural resources including wildlife biology, and insect and disease control.

## FOREST CHEMISTRY

Recent developments of the science of polymer chemistry have had a profound impact on the study of forest products, for it has increased the knowledge of the chemical nature of wood, which is a mixture of natural polymers. Many fundamental problems related to life processes are also being investigated by chemists who have adequate training in the life sciences and especially in the

physiology of animals, plants, insects and micro-organisms. The chemistry department, therefore, has a Wood and Polymer Chemistry option and a Biochemistry option. By selection of proper electives, students may be certified on graduation as having completed an American Chemical Society approved curriculum. Both options permit specializations in areas that are not generally available within the usual liberal arts program.

### FOREST ENGINEERING

The forest engineering curriculum is designed to serve those students interested in both forestry and engineering who look forward to challenging careers in the engineering and development aspects of forest resource management. Effective resource management is more and more dependent upon forest engineering for such projects as site construction and other physical development, transportation system planning, road and bridge construction, new buildings and service facilities, hydrologic structures, equipment engineering, modern electronic measurements and communications, data control and analysis, and systems and operations engineering. Combining civil or industrial engineering principles with essential forestry course work, this curriculum consists of a

four-year degree program at the College with a fifth year in engineering at Syracuse University where an engineering degree is awarded. Graduate programs can also follow the four-year forest engineering curriculum.

## LANDSCAPE ARCHITECTURE

The profession of landscape architecture is expanding to meet new demands for functional and attractive outdoor environments in town and city as well as an increased demand for recreational areas in rural and forest lands. Site planning is an integral part of industrial, commercial and public building location. Highway and parkway planning has a new requirement of environmental compatibility as well as efficiency. An association with forestry is valuable for a thorough understanding of man's need to appreciate ecological relationships in his city and rural landscapes. Students must acquire a basic understanding of the multiple aspects of land resource use. The curriculum offered by the School of Landscape Architecture emphasizes design, graphics, construction, plant materials, planning and land administration.

## PAPER SCIENCE AND ENGINEERING

The pulp and paper industry is one of the major industries in our nation, and is expanding all over the world. This complex industry will require an increasing supply of highly skilled and specialized personnel, including control chemists, research chemists, production engineers, and technical service representatives. An education in paper science and engineering is related to the physical sciences, mathematics, and chemical engineering with special emphasis on their applications to the fundamental principles of pulping and papermaking. These studies involve chemistry, physics, the chemistry of pulping and bleaching, engineering principles of pulping, paper formation, drying, and finishing and the application of these sciences and principles to processing and production. Two options are offered; one a prelude to graduate study, and the other more engineering oriented.

## RESOURCES MANAGEMENT

This curriculum prepares men for professional positions as forest land managers. It provides an understanding of the principles and relationships of nature's processes, joined with an appreciation of how man's use of his resources is an integral part of his whole society and economy. Integration of the biological, engineering, technical, economic, and managerial concerns of forest land and resources use is emphasized, building upon essential understanding in general education. Resources management is recommended for students interested in timber management, forest protection, watershed management, and the management of forest recreation lands. It is flexible enough to allow courses in several areas, including resources planning, administration, applied biology, world forestry, and conservation, and provides sound preparation for graduate study in forestry.

## WOOD PRODUCTS ENGINEERING

Technology of the wood products industries has become highly complex, providing broad opportunities for professional employment to qualified graduates. Knowledge of the structure and properties of the many commercial woods, their processing, manufacture into finished products, and new product development, as well as their distribution to the consumer, is a part of the training of a wood products engineer. Basic sciences and engineering principles are a requisite in the wood manufacturing industries, as well as the wood treatment industries.

The management of wood products industries and the marketing of wood products require the basic principles of business administration, in addition to extensive technical knowledge. Graduates of wood products engineering are in demand for industrial management and technical positions in the various product fields, such as veneer and plywood, furniture, adhesives, finishes, wood processing equipment, construction lumber, and allied industries. Three options are offered to permit flexibility in pursuing different areas within this field. Challenging careers are available in research, education, and similar technical services, both public and private. Opportunities for self-employment are numerous.

# IV

# UNDERGRADUATE STUDY

## HOW TO PREPARE FOR THE COLLEGE OF FORESTRY

Your admission to the College will be based on your academic qualifications after careful analysis of data provided by your high school or other scholastic records, standardized tests, and school recommendations. In many cases an interview will be held to assess interests and scholastic abilities.

Minimum requirements are at least 16 units as follows: English, four units; history (social studies), two units; science (at least one unit in chemistry or physics), two units; mathematics (through trigonometry), three units; and electives, five or more units. A foreign language and mechanical drawing are recommended electives.

New York Regents grades of at least 70 per cent are required for admission. Applicants who do not offer Regents credit may take the Scholastic Aptitude Test of the College Entrance Examination Board, and/or subject area achievement tests.

## COLLEGE LIFE

Your Freshman year will likely set the pattern of your undergraduate education. You will probably determine your standard of scholarship and the degree of participation in extracurricular activities for your college career. You will decide upon objectives and activities important to you. The management of your time for study, work or play, and the responsibility for your every action will rest with you. This is the period when you will make new friends and find your place in a new environment.

### *Orientation*

To help ease the adjustment to college life, ALL FRESHMEN AND NEW TRANSFER STUDENTS are required to attend an orientation period during registration week of the Fall semester. Here you will meet your classmates and members of the faculty and administration. You will become acquainted with the College, its function and operation, and the various services available to you. A special orientation for foreign students is provided through the Office of International Forestry.

A weekly one-hour convocation (orientation) course is required throughout the semester for all freshmen students. In addition, a shorter orientation program is required for transfer students. During the early, formative period in your college career you will learn what is expected of you, and where to get help when you need it. Most of all, you will become acquainted with the general college policy which affects every student throughout his academic career.

### Work Load

Classes, laboratories, and study will occupy by far the greatest portion of your time at the College. Even though you anticipate working harder than ever before at college, you will find that it requires more time than you expected. The average Freshman spends about 24 hours a week in class, and at least a like amount of time in out-of-class study. The usual credit hour load is 17.

Even so, you will have reasonable opportunity to participate in extracurricular activities. In these activities you find social and recreational outlets and develop qualities of leadership, strengthen cultural and religious interests, and broaden your experience with people and organizations.

### Extracurricular Activities

STUDENT GOVERNMENT: As a member of the student body, you will participate in the election of class officers and the Student Council. The Council is the official representative body governing extracurricular student affairs. It supervises and finances a number of student activities.

PUBLICATION: The KNOTHOLE is a news sheet published periodically during the school year. It contains both news and opinion and is produced entirely by its student staff. The EMPIRE FORESTER is the College yearbook, and has a long tradition of excellence. It is published by a student staff with a faculty advisor.

PROFESSIONAL AND DEPARTMENTAL ORGANIZATIONS: There are several opportunities for you to join clubs that will advance your knowledge and broaden your acquaintance with students of similar interests. Following is a list of these organizations: Botany Club, Chemistry Club, Entomology Club, Forest Engineers' Club, Mollet Club (landscape architecture), Papyrus Club (pulp and paper), Wood Engineers' Club, and the Forest Zoology Society.

OTHER ORGANIZATIONS: Vox Silvae is an organization to improve the public speaking ability of students through debate. Robin Hood is the all-College Junior honorary society. Alpha Xi Sigma is the senior honorary society. Saengerbund is the College glee club.

### Syracuse University

As stated previously, the College of Forestry is located adjacent to Syracuse University and a close relationship between the two institutions has been maintained through the years. Students may participate in Student Government, organizations, and other extracurricular activities at Syracuse University.

Courses: Some of the required course work in general education and basic physical sciences at the College is taken at Syracuse University. Forestry students may also take electives related to their programs of study upon receiving their advisor's approval. Courses taken at Syracuse University are covered by the tuition and fees of the College of Forestry.

Living On Campus: Residence in a Syracuse University living center or an approved sorority house (upperclasses only) is required of all undergraduate women, although permission may be secured from the Dean of Women to live with blood relatives if the parents are willing to transfer all responsibility for the student to the relative concerned.

All men are required to live in University dormitories, and the University accepts the responsibility for the housing (dormitories or fraternities) of all undergraduate men.

Syracuse University housing units are available for married students. Veterans are given preference, but there are ordinarily apartments for non-veterans.

Athletics: Payment of the general student fee entitles students to free admission to University home athletic events upon presentation of the official identification card, and the same applies to graduate students enrolled for six or more credit hours.

Athletic facilities for men include Archbold Gymnasium, which houses basketball courts, handball and squash courts, a rifle range, rowing tank, and championship-size swimming pool. A ski tow and lodge on University property at Skytop are centers of much interest and recreation during the winter. There are 22 tennis courts at the University. The new Manley Field House provides indoor practice facilities for many sports, including football, baseball, track, and lacrosse, and is the site of home basketball games.

Sports and dance activities for women offer the opportunity to acquire skill and understanding of these activities through the Department of Physical Education for Women.

## COLLEGE SERVICES

### *Academic and Personal Counseling*

The Office of Student Services is available throughout your college career as a place where you may seek, at any time, the advice of experienced counselors. The Dean of Students should be your first contact when questions or personal problems arise. General advisement for foreign students is provided by the Office of International Forestry. The Registrar in the Student Services Office is available as needed to provide information and guidance on general academic and specific program requirements. In addition the Student Financial Aids

officer of the Student Services Office provides information on available scholarships, long-term state and federal educational loans, work opportunities at the College and major financial problems.

Traditionally, the College faculty has placed emphasis on academic advisement both formally and informally to meet individual student needs and considers this close faculty-student association to be a major academic strength. During registration you will be assigned a faculty advisor to assist you as needed in your curriculum decision, program development and elective decisions. When you select a curriculum special advisors will be assigned to provide academic advice as needed. Faculty in your major department are available also for academic guidance. In addition, many classes are small permitting students ample opportunity to discuss their courses and professional aspirations with instructors. While advice and counsel are available on an individual basis as needed, students at the College are encouraged early in their careers to become independent and responsible for their academic decisions as will be required in later professional life.

### *Other Counseling*

Full-time ministries are provided in all the major religious groups. They center their programs at Hendricks Chapel, except for Roman Catholics, who are served at Saint Thomas More Chapel. The Dean of Hendricks Chapel coordinates religious activities, working with eight full-time and six part-time denominational

chaplains and advisors. The program of Saint Thomas More Chapel is under the direction of a chaplain.

Extracurricular activities are under the guidance of a faculty committee, the members of which meet with students during planning sessions and offer their counsel when necessary.

Resident counselors are located in all dormitories, and are available for help and assistance if needed.

As students reach the end of their undergraduate years, they often seek career guidance. Highly motivated students should consider the question of whether or not to continue their education in graduate school. At the College, this sort of counseling is handled by the departments or divisions in which you take your major work. At the completion of your college career, placement counseling is available.

### Health and Medical Facilities

Students may consult a physician for medical care or health advice at the Syracuse University Student Health Service, and are entitled to unlimited visits to the out-patient clinic and also 10 days of confinement with ordinary medical care in the Infirmary per college year. Infirmary usage over 10 days will be at prevailing Infirmary rates. The usual laboratory examinations if necessary for treatment or diagnosis of common illness are in the main provided without cost. Most common drugs are provided without extra charge.

A student accident or sickness insurance plan is available and not only supplements the usual Infirmary privileges, but is also a health protection during the summer months when students are not under care of the Health Service. Married students with dependents who are not covered by Health Service privileges are strongly urged to provide themselves and their families with special insurance made available to University students. *All foreign students are required to carry health and accident insurance.* Graduate student insurance requirements are explained in Chapter VII.

### Military Service

The Registrar's Office keeps on file up-to-date information on Selective Service. A request for draft deferment as a college student, of course, must be made by you and certified by the Registrar. Students reaching 18 years of age after arriving in Syracuse, may register with Selective Service in the Office of Student Services.

A Reserve Officer Training Corps program is available, however a minimum of two years is required. Continuation of R.O.T.C. during the Junior and Senior years must be approved by the College and the Military Department.

### Hearing and Speech Center

The Gordon D. Hoople Hearing and Speech Center provides remedial assistance to all regularly enrolled students who may be handicapped by hearing, speech, and voice disorders. This service is without expense to students.

### Psychological Research Center

Students desiring an analysis of their aptitudes, abilities, and interests may secure special testing programs at the Research Center.

### Reading Laboratory

The School of Education, in cooperation with the College of Liberal Arts and the Psychological Research Center, maintains a reading laboratory for research in the learning skills and for training teachers and specialists in reading. Representatives from the fields of medicine, speech, and psychology cooperate in making diagnoses and in planning remediation. Large numbers of University students use this facility to improve their reading skills.

## COLLEGE REGULATIONS

The complete rules and regulations governing all students while attending the College of Forestry, and residing on the Syracuse University Campus is a separate publication entitled *Undergraduate Student Handbook.* It may be obtained from the Office of Student Services, and is distributed to students at registration. However, it is the student's responsibility to secure a copy and

become thoroughly familiar with it. The following information does not endeavor to prescribe in detail what is either permitted or denied, but rather is confined to some of the basic academic regulations and procedures of interest to entering students.

### Course Selection

Courses are to be chosen in accordance with the regulations of an established degree program, and it is the student's responsibility to plan his program so that all degree requirements are met.

### Course Load

Normally a full-time undergraduate student will register for a course load of 15 to 18 hours.

### Late Registration

A student who fails to report for registration or fails to complete registration during the authorized period, is subject to a penalty unless excused by the Dean or his representative.

### Assignment of Grades

In each course final grades are given at the end of the semester and are expressed in letters as follows: A—excellent, B—good, C—average, D—minimum passing, F—failure, INC—incomplete, and in theses courses, S—satisfactory, U—unsatisfactory. An incomplete must be made up within one year (time not registered as a student does not count) or an F is recorded.

### Grade-Point Average

For the purpose of determining grade-point averages, letter grades have the following values: A, 4 points for each semester hour; B, 3 points for each semester hour; C, 2 points for each semester hour; D, 1 point for each semester hour; and F, no points. Both semester and cumulative scholastic averages are computed by dividing the total grade points accumulated by the total credit hours carried. Only courses carried at the College of Forestry or Syracuse University, including Utica College and University College, are used to compute grade-point averages.

### Academic Standards

A student whose cumulative or semester average falls below 2.00 (C) will have his record reviewed by the Academic Standards Committee. If the record indicates that he might be able to meet the requirements later, he will be placed on probation. If, however, in the judgement of the Committee, he will not be able to meet the requirements, he will be academically dismissed. Freshmen will not be dropped at the end of the first semester. They must achieve a 1.7 cumulative

average or better at the end of the second semester to be eligible to continue at the College.

### Graduation Requirements

A student will be recommended for graduation only if he has completed the required courses, prescribed for his major, and has a minimum average of 2.00. In general, this requires four years' work, either at this College or in some other College of approved standing. Residence at this College during the final year is obligatory. In some degree programs there are requirements which must be completed during one of the summer periods.

### Academic Honors

Students achieving a 3.0 (B) average or above for the semester are placed on the Dean's Honor List and a commendation is sent by the Dean to both students and parents.

Graduation Honors: A student is recommended for the Bachelor degree *summa cum laude* if his average for the four years is 3.83 or better; for the degree *magna cum laude* if his average is 3.34 to 3.82; and for the degree *cum laude* if his average is 3.0 to 3.33.

## COST OF ATTENDING THE COLLEGE

The tuition and fee structure includes library, health, infirmary, physical education, R.O.T.C., special testing and other services, as well as an assessment for student activities and charges for expendable supplies and equipment. A non-refundable fee of $5 must accompany the application for admission, but is not required of transfers from other units of State University of New York. (Graduate students refer to Chapter VII).

### *Residents of New York State*

Total tuition and fees of $435.00 to be paid as follows:

| | |
|---|---|
| Advance Payment* | $100.00 |
| Due at September registration | 167.50 |
| Due at February registration | 167.50 |
| Total | $435.00 |

### *Non-residents of New York State*

Total tuition and fees of $635.00 to be paid as follows:

| | |
|---|---|
| Advance Payment* | $100.00 |
| Due at September registration | 267.50 |
| Due at February registration | 267.50 |
| Total | $635.00 |

*Advance Payment of $100 is due within thirty days from the date of acceptance. It is refundable up to May 1.

### *Other Costs*

Assessment for the Student Loan Fund and Alumni Association membership of $1 is required of sophomores each semester, and all new transfer students in their first year. A commencement fee of $10 is required at the beginning of the semester in which the degree is expected.

Housing costs at Syracuse University range from $400 to $600 for 34 weeks depending upon the size of the room. Most rooms are for two students and are furnished with beds, mattresses, pillows, desks, chairs, study lamps, and dressers. A commercial linen service operates on campus and is available for those who order it.

Boards costs at Syracuse University are $550 for 34 weeks, 20 meals weekly (none Sunday night). Housing and board rates are subject to change and inquiries about them should be sent to: Dean of Men, or Dean of Women, Syracuse University, Syracuse, New York 13210.

Other expenses, including books and supplies, average about $85 for the fall semester and $65 for the spring semester. Certain curriculums require a summer session in field forestry following the sophomore year, which lasts for five weeks and costs approximately $160. Extended field trips, lasting up to three weeks, are required in landscape architecture, pulp and paper technology, and wood products engineering, and these range in cost from $60 to $150.

### *Terms of Payment*

A check or money order for tuition and fees should be made payable to "State University College of Forestry," and payment is made at the Business Office of the College. The advance payment should be mailed to the Business Office, College of Forestry, Syracuse, New York 13210.

*Payment for housing and board is made directly to Syracuse University.*

## FINANCIAL AID

It is easier today than ever before to finance a college education. Various types of scholarships, government aid, and loans are available at the College of Forestry for students who need financial assistance. Scholarships and loans are often obtained from sources in the students' home communities, such as companies, fraternal organizations, service clubs, churches, alumni groups and the like.

Complete information on financial assistance may be obtained from the Student Financial Aids officer at the College, either directly or by mail. Some of the various types of aid, however, are listed below:

For New York State residents, the Scholar Incentive Program, Regents Scholarships, and State University Scholarships offer possible financial aid. The New York Higher Education Assistance Corporation offers loans to residents which are interest free until after college, and then draw 3 per cent annual interest. Repayment terms are arranged after graduation.

Any student in good standing and who needs financial assistance may borrow up to $500 a semester under the Student Loan Program of the National Defense Education Act of 1958. No interest will accrue until one year after college, and part of the loan will be cancelled if the student becomes a public elementary or secondary school teacher or college teacher. A 10-year repayment period is allowed.

The College of Forestry Alumni Association offers a variety of assistance. Memorial Awards are made to outstanding students, interest-free loans are available to meet emergency expenses, and several educational grants ranging from $200 to $500 each are made each year.

A limited number of tuition waivers are available for award to qualified foreign students.

Special financial assistance include the following: Charles Lathrop Pack Awards, Charles Malcomb Harlow Memorial Loan Fund, Friedrich U. Klaehn Memorial Scholarship in Silviculture, David B. Schorer Memorial Fund, Edward Vail Emergency Fund, C. Ives Gehring Memorial Fund, James D. Judson Memorial Fund, Bargeron Memorial Scholarship, Portia Farrell Morgan Scholarship, Phyllis Roskin Memorial Award, Syracuse Chapter of CSEA Scholarship, and the Student Association Grant.

Other opportunities include: Allied Paper Salesmen's Association Award, Harold L. Austin Memorial Scholarship, Black-Clawson Scholarship, Boxboard Research and Development Scholarship, Nelson Courtlandt Brown Scholarship Fund, Henry H. Buckley Student Aid Awards, Geigy Dyestuff's Scholarship, C. E. Libby Award, Mean Corporation Award, Milton Conservation Club Award, Frank B. Myers Memorial Award, New York-Canadian Division of Paper Industry Management Association Scholarship, Pen-Jer-Del Division of the Paper Industry Management Association Scholarship, Plastics Engineer's Award, St. Regis Paper Company Scholarship, and Syracuse Pulp and Paper Foundation Grants.

In addition, work scholarships are available to pre-freshmen, there are part-time work opportunities at the College, and the Economic Opportuntity Act of 1964 offers a work-study program.

## HOW TO APPLY FOR ADMISSION

### *Entering Freshmen*

To apply for admission, you should request the proper forms and information from the College's Office of Admissions. Allow about three weeks for delivery of this material. Revised forms are available beginning in September of one year for entry the following year.

Early acceptance for September admission will be given when warranted by the record supporting an application, and notices of early acceptance are mailed beginning December 15. The target date for final decision on most applications for September entry is April 1. A copy of the message of decision on an application is sent to the applicant's high school. (Graduate students refer to Chapter VII).

### *Transfer Students*

Students with previous college experience, or who are currently enrolled at another college may apply for transfer. Transfer applications are considered for February as well as September. However, February transfer will depend upon the availability of courses appropriate to the curriculum selected.

It is College policy that any student who is academically dismissed must wait at least one semester before applying to this college.

Students with two years of college can generally arrange their programs to allow transfer to the College of Forestry as a Junior, with the exception of Landscape Architecture, which requires three years at the College to complete degree requirements. Any one of three tracks may be used by students transferring to the College. For detailed information concerning transfer requirements, please refer to page 36.

In applying to the College for transfer, it is your responsibility to submit a recent official transcript from the college you are currently attending, and similar documents from all colleges previously attended. Also, a catalog from each college may be required.

### *International Students*

The College accepts international students on the undergraduate level if they can satisfy all regular admissions requirements. It is recommended, however, that students from foreign countries obtain their baccalaureate degree in their home country if at all possible and apply to the College as a graduate student. Experience has shown that this arrangement provides for greater academic achievement and more efficient use of the student's time and funds. If an international student wishes to apply as an undergraduate, he must meet the secondary school requirements for entrance; show that he is proficient in the English language through acceptable results of the TOEFL test and/or College Entrance Examination Board Achievement Test in English; provide competitive scores on the C.E.E.B.'s Scholastic Aptitude Test in the verbal and math areas; and produce evidence that he can meet all financial obligations.

Undergraduate foreign students must file official State University of New York admissions forms. These may be obtained by writing to the Director of Admissions at the College. No fee is required for processing the application. If the foreign student is accepted, he must obtain adequate health and accident insurance before he will be allowed to register at the College.

International students who are currently enrolled at an American college may apply for transfer to the College. They must meet all regular entrance requirements plus those of a Transfer Student as listed on pages 36 and 37.

### *Admission Examination*

State University of New York requires an applicant for admission (except foreign students) to take its standardized State University Admissions Examination if the applicant is residing or attending school in the State during the year prior to entrance to college. The College Director of Admissions may waive the requirement for, (1) applicants from outside New York State, who must substitute scores earned in the Scholastic Aptitude Test of the College Entrance Examination Board, (2) late applicants, and (3) applicants for admission as transfers from another college.

Information about the times and places that the examination is held is provided in the kit of application materials. The Regents Scholarship Examination, given in high schools of New York during the first part of October, serves as a State University Admissions Examination. Scores that an applicant earns on either examination are provided to the College as confidential information from State University of New York.

### *Health Examination Report*

Each new student is required to submit a history and physical examination report on a form that will be sent after the initial acceptance notice. *It is to be completed and returned within two weeks to the Admissions Office, State University College of Forestry, Syracuse, New York 13210.*

### *Entrance With Advanced Standing*

Secondary school students may earn credit toward the B.S. or B.L.A. degree before enrolling as freshmen at the College. This enables students to carry lighter course loads, and may be accomplished in two ways:

1. Evening and Saturday courses in mathematics or English, for instance, given by a nearby college may be open to recommended high school seniors. After successful completion, an official transcript or other appropriate document should be sent to the College by the institution along with a catalog description of the course or courses.

2. College-level courses given by high schools in the Advanced Placement Program of the College Entrance Examination Board to recognize and develop academic talent. Such courses as biology, mathematics, chemistry, English, and foreign languages offer opportunity for degree credit at this College. The determination of credit is made by faculty members to whom the student's final examination papers are sent after they have been graded.

### *College Proficiency Examinations*

The New York State College Proficiency Examination Program is a means by which students may receive college credit for specific courses by examinations, without being in residence for a course or taking structured correspondence lessons. The College also accepts the College Level Examination Program (CLEP) of the College Entrance Examination Board. These examinations are open to all who make application.

The College approves of the CPE and CLEP programs in general and will evaluate the performance of participants. Satisfactory performance by a student must be demonstrated during at least one semester in residence at this College before granting credit. This residence may be prior or subsequent to the examination.

If all College policy requirements are met, grades A and B will receive credit; credit for a grade of C will be granted only upon recommendation of the department of the applicant's major; and no credit will be granted for a grade lower than C.

Application for credit should be made to the Office of Student Services. Application for deviation from the prescribed policy may be made to the Academic Standards Committee for undergraduate credit and the Committee on Graduate Studies for graduate credit.

# V

# UNDERGRADUATE PROGRAMS

## ENTERING FRESHMEN

Of the seven four-year curriculums described in Chapter III, six lead to Bachelor of Science degrees, and one to the Bachelor of Landscape Architecture degree.

Entering Freshmen will review the demands and opportunities of the curriculums with an assigned advisor during the registration period, in order to select the first-semester elective. Before the end of the first semester, however, each Freshman must make his curriculum choice. In reaching this decision he will be assisted as needed by faculty advisors, the Dean of Students, by conversations with upperclassmen, and by first-hand acquaintance with the College's programs, facilities, and personnel.

### FRESHMAN YEAR – FIRST SEMESTER – ALL CURRICULUMS

| | | *Credit Hours* |
|---|---|---|
| *F. Botany 100 | Forest Botany | 4 |
| English | Freshman English | 3 |
| Mathematics | | 3 |
| **Chemistry 106 | General Chemistry | 4 |
| Elective | | 3 |
| Orientation | | 0 |
| Phys. Educ. or ROTC | | 0 |
| | | 17 |

Students interested in meeting the education requirements for initial professional forestry positions in federal and state resource managing agencies are able to qualify fully by successful completion of either the Resources Management curriculum or the Forest Engineering curriculum. They may also do so in the Forest Biology curriculum through selection of appropriate forestry courses as electives, under guidance of a faculty advisor.

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*Those students who definitely know that they are going to pursue the Materials Marketing option in Wood Products Engineering should take F. Economics 290. Introduction to Economics for Forestry, 3 cr. hrs. and Graphics 280. Technical Drawing, 1 cr. hr., instead of F. Botany 100, 4 cr. hrs.

**Students who definitely know they are going to pursue the Landscape Architecture Curriculum may take Physics 103 (with consent of their advisor) instead of Chemistry 106.

## TRANSFER STUDENTS

The College of Forestry has structured its undergraduate curricula to accommodate entering transfer students from Community and other Colleges. Students taking these recommended programs may register at entering Junior level (Sophomore level for Landscape Architecture) without credit loss. The curricula are flexible and special program adjustments will permit many other transfer students to arrange programs leading to a Bachelor's degree in two years (Landscape Architecture—3 years). Transfer into the Landscape Architecture Program without credit loss is best accomplished at the end of the Freshman year. Attendance at a College of Forestry summer session is required in some cases and also provides added opportunity to transfers as needed to complete special program requirements. Transfer students will be held for the total credit hour requirement of the curriculum in which they are enrolled.

The admissions office will be pleased to evaluate records in cases where there are questions about qualifications for transfer and applicants are requested to follow the procedures described on page 31.

Recommended course programs for entry into the College's seven undergraduate curriculums are described as follows:

### A. FOREST SCIENCES AND ENGINEERING PROGRAMS

Recommended Core Courses for Students Planning to Transfer as Juniors to Programs in *Forest Biology* (pages 39–41), *Forest Chemistry* (pages 42–45), *Forest Engineering* (page 46), *Paper Science* and *Engineering* (pages 50–53), *Wood Science* (page 56), or *Production Engineering* (page 58).

| | |
|---|---|
| Biology | 8 credits |
| General Chemistry | 8 credits |
| Organic Chemistry[a] or electives | 8 credits |
| Physics | 8 credits |
| Mathematics (thru Integral Calculus) | 9 credits |
| Economics | 3 credits |
| English | 6 credits |
| Electives | 14 credits |
| Total | 64 credits[b] |

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[a] Organic Chemistry is not required for Forest Engineering or Production Engineering.
[b] or an Associate Degree which includes the above course requirements.

Additional Requirements for *Forest Biology*

| | |
|---|---|
| Summer Session in Field Forestry (5 weeks course at Pack Demonstration Forest, Warrensburg, N.Y.) | 6 credits |

Electives in the above core should include 3 courses totalling 9 credits in the humanities and social sciences.

## B. FOREST RESOURCES MANAGEMENT AND MATERIALS MARKETING PROGRAMS

A Recommended Program of Courses for Students Planning to Transfer as Juniors to *Resources Management* (page 54) or *Materials Marketing* (page 60).

| | |
|---|---|
| Physical & Biological Sciences | 12–16 credits |
| Mathematics | 3–9 credits |
| Social Sciences & Humanities | 15–23 credits |
| Total credits in the above areas should be 45 | |
| Electives | 19–23 credits |
| Total | 64 credits[b] |

Additional Courses Required for *Resources Management*

| | |
|---|---|
| Summer Session in Field Forestry (5 weeks course at Pack Demonstration Forest, Warrensburg, N. Y.) | 6 credits |

## C. LANDSCAPE ARCHITECTURE PROGRAM

A Recommended Program of Courses for Students Planning to Transfer as Sophomores to the *Landscape Architecture* curriculum. Transfer into this program without credit loss is best accomplished at the end of the Freshman year.

| | |
|---|---|
| Biology | 4 credits |
| General Chemistry or Physics | 4 credits |
| Mathematics | 3 credits |
| English | 6 credits |
| Technical Drawing | 2 credits |
| Electives (recommended electives are Public Address—3 credits and Geology—3 credits) | 15 credits |
| Total | 34 credits |

## DUAL ENROLLMENT WITH TWO YEAR COLLEGES

The College of Forestry has completed an arrangement for a dual enrollment program with Columbia-Greene Community College for those students who wish to transfer to the College. Any applicant for the Liberal Arts, Math and Science program with a Forest Management concentration at the two-year college is evaluated by both institutions. Upon acceptance and successful completion of the Associate in Science Degree, the student is automatically accepted to the College of Forestry. Dual enrollment programs are to be expanded to other two-year colleges in the near future.

## FOREST BIOLOGY

The Forest Biology Curriculum is designed to educate biologists, and to provide them an orientation to forestry principles. This program was developed for those students planning graduate study in the biological sciences as well as those seeking positions as forest biologists in forestry, such as forestry research, disease and insect control, recreation, or conservation. The effective management and protection of forests and related natural resources are becoming increasingly dependent on the research contributions and professional guidance of biologists for solutions of a wide range of natural resource problems.

The curriculum is built around a core of required courses which provide a sound background in biology and the physical sciences, an introduction to forestry principles, and a general education. It is designed to achieve breadth in biology as well as depth in a selected concentration area. The Forest Biology Curriculum is flexible and a variety of programs may be developed within or across the various participating departments to meet the academic goals and special subject interests of the student. Each student is assigned an advisor to aid in program decisions. All students are considered to be majoring in *biology*.

General requirements for federal and state biology positions are met. Position requirements in a broad range of special biological fields related to natural resources also may be achieved by selection of electives. Requirements for federal and state forestry positions may be satisfied by choosing specified forestry subjects as electives.

The curriculum has been arranged to facilitate transfer of students from the State University Community Colleges at the end of their Freshman or Sophomore years.

In addition to the courses specified in the program, students must meet the following requirements:

1) Twelve credits in a selected biology concentration (Zoology or Wildlife Biology, Botany, Forest Entomology, Silvics).

2) Six credits in a second biological area.

3) The courses selected in the concentration subjects should include at least one from each of three of the following broad areas of biology: physiology, classification, structure-development, and ecology.

4) Three credits in the Resources Management area.

5) Nine credits in the humanities and social sciences selected with the approval of the faculty advisor.

6) Twenty-seven credits in elective courses selected with the approval of the faculty advisor.

### Electives

1. Students planning graduate study are urged to take two semesters of a language (as approved by their faculty advisor) as a part of their humanistic-social sciences electives requirement.
2. Students planning to meet special requirements for biology specialty positions in federal and state service should review the available Civil Service publications and become familiar with the specific course requirements to be met by elective substitution with the approval of the faculty advisor.
3. Students planning to meet special requirements for federal Civil Service positions in forestry at the GS-5 and GS-7 levels may do so by electing 10 credits in additional forestry courses and attending the Summer Session in Field Forestry at Warrensburg, N.Y. These special forestry requirements may be fulfilled by courses selected with the approval of the faculty advisor.

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1. *Mathematics through integral calculus (Math 227 or the equivalent) is required.
2. **Students may substitute for this requirement 6 Credit Hours of courses at the Cranberry Lake Biology Station or other Biological Field Stations. The courses selected must have the approval of the student's advisor. A minimum of 6 Credit Hours is required and it is preferable that the summer program be taken between the Junior and Senior Years.
3. Five credits of additional forestry courses are recommended for those students not attending the summer session in field forestry.
4. A total of 132 credit hours is required.

## FOREST BIOLOGY CURRICULUM

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| Chem 106 | General Chemistry | 4 | Chem 116 | General Chemistry | 4 |
| F Bot 100 | Forest Botany | 4 | F Zool 100 | General Zoology | 4 |
| Engl 101<br>or 103 | Basic Freshman English<br>Advanced Freshman English | 3 | Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| Orientation | | 0 | | | |
| | | 17 | | | 17 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| F Biol 320 | General Ecology | 3 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Electives | | 6 | Electives | | 6 |
| | | 17 | | | 17 |

SUMMER SESSION IN FIELD FORESTRY 5 weeks—6 credit hours: This program is conducted in two separate sessions during the summer period at the College's Pack Demonstration Forest near Warrensburg, N.Y. **See Note 2 below.

| | | |
|---|---|---|
| F Biol 301 | Field Biology | 1 |
| Silvi 302 | Silvics | 1 |
| F Mgt 303 | Introduction to Forest Measurements | 1 |
| Res Mgt 304 | Silviculture—Resource Management | 3 |
| | | 6 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 210 | Dendrology I | 2 | F Bot 211 | Dendrology II | 1 |
| F Ento 500 | Elements of Forest Entomology | 3 | A M 571<br>or<br>A M 591 | Introduction to Statistical Analysis (3)<br>Introduction to Probability and Statistics (3) | 3 |
| F Biol 330 | Principles of General Physiology | 3 | Geol 105<br>or<br>Silvi 332<br>and<br>Silvi 333 | Introductory Geology (3)<br>Soils (2)<br>Soils Lab (1) | 3 |
| Electives | | 6 | Electives | | 6 |
| | | 14 | | | 13 |

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Biol 570 | Fundamentals of Genetics | 4 | Electives | | 15 |
| Electives | | 12 | | | |
| | | 16 | | | 15 |

## FOREST CHEMISTRY

By selecting proper electives, students in either of the two following options may be certified on graduation as having completed an American Chemical Society approved curriculum.

### *Biochemistry Option*

This program provides training in the basic physical sciences with supplementary instruction in the biological areas. The option includes inorganic, organic, physical, and analytical chemistry courses as well as biochemistry, mathematics, and physics. The required biological courses are botany, dendrology, zoology, plant physiology, and genetics.

# FOREST CHEMISTRY CURRICULUM

## BIOCHEMISTRY OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | Forest Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 4 | Chem 116 | General Chemistry | 4 |
| Engl 101<br>or 103 | Basic Freshman English<br>Advanced Freshman English | 3 | Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| Orientation | | 0 | | | |
| | | 17 | | | 17 |

### Sophomore Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| Phys 105 | General Physics for Science Students I | 4 | Phys 106 | General Physics for Science Students II | 4 |
| Graph 280 | Technical Drawing | 1 | Elective | | 3 |
| F Econ 290 | Introduction to Economics for Forestry | 3 | | | |
| | | 17 | | | 16 |

### Junior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 210 | Dendrology I | 2 | Math Elective | | 3 |
| Chem 332 | Quantitative Analysis | 2 | Chem 434 | Instrumental Analysis | 2 |
| Chem 333 | Quantitative Analysis Lab | 1 | Chem 435 | Instrumental Analysis Lab | 1 |
| Chem 346 | Physical Chemistry | 3 | Chem 356 | Physical Chemistry | 3 |
| Chem 347 | Physical Chemistry Lab | 1 | Chem 357 | Physical Chemistry Lab | 1 |
| **Biology Elective | | 3 | **Biology Elective | | 3 |
| Elective | | 3 | Elective | | 3 |
| | | 15 | | | 16 |

### Senior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Biol 570 | Fundamentals of Genetics | 4 | Pub Add 215 | Public Speaking | 3 |
| F Chem 495 | Introduction to Research I | 1 | F Chem 498 | Introduction to Research II | 6 |
| F Chem 572 | Chemistry and Biochemistry of Wood | 3 | F Chem 497 | Undergraduate Seminar | 1 |
| F Chem 573 | Cellulose and Wood Chemistry Lab | 1 | F Chem 532 | Biochemistry II | 3 |
| F Chem 530 | Biochemistry I | 3 | Elective | | 3 |
| F Chem 531 | Biochemistry Lab | 2 | | | |
| Elective | | 3 | | | |
| | | 17 | | | 16 |

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1. *Mathematics through Math 227, or Math 397, or the equivalent, is required.
2. **Three credit hours have to be in Physiology; for the other three a course in structural and/or developmental biology is recommended.
3. A total of 131 credit hours is required.

### *Wood and Polymer Chemistry Option*

This option supplements the classical chemistry curriculum with its thorough grounding in the basic sciences by incorporating studies of the chemistry of synthetic polymers, cellulose, and other natural polymers, and the structure, anatomy, and physics of wood. A substantial number of industries are seeking employees with this training and superior students are well qualified for continuing into graduate school.

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1. *Mathematics through Math 227, or Math 397, or the equivalent, is required.
2. A total of 131 credit hours is required.

# FOREST CHEMISTRY CURRICULUM
## WOOD & POLYMER CHEMISTRY OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Bot 100 | Forest Botany | 4 |
| Chem 106 | General Chemistry | 4 |
| Engl 101 .<br>or 103 . | Basic Freshman English<br>Advanced Freshman English | 3 |
| *Math | | 3 |
| Elective | | 3 |
| Phys Ed or ROTC | | 0 |
| Orientation | | 0 |
| | | 17 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| F Zool 100 | General Zoology | 4 |
| Chem 116 | General Chemistry | 4 |
| Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| *Math | | 3 |
| Elective | | 3 |
| Phys Ed or ROTC | | 0 |
| | | 17 |

### Sophomore Year

| | | |
|---|---|---|
| F Chem 221 | Organic Chemistry I | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 |
| Engl 210 | Advanced Composition and Literature | 2 |
| *Math or Elective | | 3 |
| Phys 105 | General Physics for Science Students I | 4 |
| Graph 280 | Technical Drawing | 1 |
| F Econ 290 | Introduction to Economics for Forestry | 3 |
| | | 17 |

| | | |
|---|---|---|
| F Chem 223 | Organic Chemistry II | 3 |
| F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 211 | Technical Writing | 2 |
| *Math or Elective | | 3 |
| Phys 106 | General Physics for Science Students II | 4 |
| Elective | | 3 |
| | | 16 |

### Junior Year

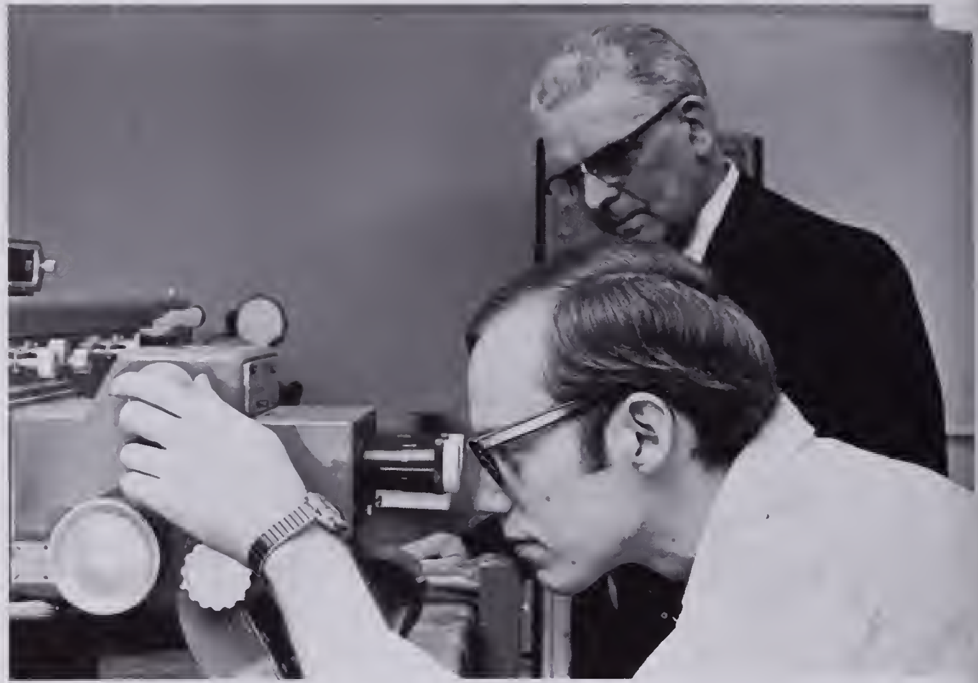
| | | |
|---|---|---|
| F Bot 210 | Dendrology I | 2 |
| Chem 332 | Quantitative Analysis | 2 |
| Chem 333 | Quantitative Analysis Lab | 1 |
| Chem 346 | Physical Chemistry | 3 |
| Chem 347 | Physical Chemistry Lab | 1 |
| Math Elective | | 3 |
| Elective | | 3 |
| | | 15 |

| | | |
|---|---|---|
| Pub Add 215 | Public Speaking | 3 |
| Chem 434 | Instrumental Analysis | 2 |
| Chem 435 | Instrumental Analysis Lab | 1 |
| Chem 356 | Physical Chemistry | 3 |
| Chem 357 | Physical Chemistry Lab | 1 |
| WPE 388 | Wood Structure and Properties | 4 |
| Elective | | 3 |
| | | 17 |

### Senior Year

| | | |
|---|---|---|
| F Chem 495 | Introduction to Research I | 1 |
| F Chem 550 | Introduction to Polymer Chemistry I | 3 |
| F Chem 551 | Polymer Techniques | 2 |
| F Chem 572 | Chemistry and Biochemistry of Wood | 3 |
| F Chem 573 | Cellulose and Wood Chemistry Lab | 1 |
| F Chem 530 | Biochemistry I (3) or other professional electives | 3 |
| Elective | | 3 |
| | | 16 |

| | | |
|---|---|---|
| F Chem 498 | Introduction to Research II | 6 |
| F Chem 552 | Introduction to Polymer Chemistry II | 3 |
| F Chem 497 | Undergraduate Seminar | 1 |
| Elective | | 3 |
| Elective | | 3 |
| | | 16 |



## FOREST ENGINEERING

The primary objectives of this curriculum are: (1) to provide a creditable discipline combining portions of civil, industrial, and mechanical engineering with corresponding essentials of forestry preparation for resource management, and (2) to qualify men for professional acceptance both as foresters and as engineers in those career opportunities where close collaboration in both of these professional fields is required.

The curriculum consists of a four-year program at the College of Forestry preparatory to a fifth year in engineering at Syracuse University. The B.S. degree will be awarded by the College upon completion of the four-year program; a B.S. degree in engineering will be awarded also by Syracuse University upon completion of requirements in a fifth year. Graduate programs at the College, building upon the four-year forest engineering curriculum, are also possible during the fifth year.

Minimum professional requirements both in forestry and engineering are met by the core of required courses, and these are strengthened in areas suited to the student's goals through proper advisory use of the 24 to 27 hours of electives that may be taken throughout the program.

# FOREST ENGINEERING CURRICULUM

## Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | Forest Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 4 | Chem 116 | General Chemistry | 4 |
| Engl 101<br>or 103 | Basic Freshman English<br>Advanced Freshman English | 3 | Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective (Philosophy preferred) | | 3 | Elective (Philosophy preferred) | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| Orientation | | 0 | | | 17 |
| | | 17 | | | |

## Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 210 | Dendrology I | 2 | F Bot 211 | Dendrology II | 1 |
| Graph 280 | Technical Drawing | 1 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| Elective (Logic) | | 3 | Geol 105 | Introductory Geology | 3 |
| Elective | | 3 | Elective | | 3 |
| | | 16 | | | 17 |

## Junior Year

| | | | | | |
|---|---|---|---|---|---|
| A M 591 | Introduction to Probability and Statistics | 3 | F Engr 301 | Plane and Geodetic Surveying | 3 |
| F Econ 301 | Introduction to Micro-Economics | 3 | F Engr 563 | Photogrammetry | 3 |
| M E 225 | Engineering Mechanics | 4 | F Engr 340 | Hydrology | 3 |
| Silvi 351 | Meteorology and Fire Behavior | 3 | Silvi 521 | Principles of Silviculture | 3 |
| A M 565 | Introduction to Computer Programming | 3 | C E 325 | Mechanics of Deformable Bodies | 3 |
| | | | Elective | | 3 |
| | | 16 | | | 18 |

## Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Mgt 554 | Forest Administration and Policy | 3 | F Mgt 552 | Management Planning and Operations | 3 |
| F Econ 510 | Principles of Forestry Economics | 3 | Elective (Legal concepts recommended) | | 3 |
| C E 437 | Soil Mechanics and Foundations I | 3 | M E 226 | Engineering Mechanics | 3 |
| F Engr 410 | Structures | 3 | F Mgt 522 | Mensuration | 3 |
| F Engr 412 | Principles of Production (Harvesting) | 3 | Elective | | 3 |
| Elective | | 3 | Recommended: | | |
| Recommended: | | | CE 332 | Structures II | |
| Math 585 | Higher Mathematics for Engineers and Scientists I | | or | | |
| or | | | I E 526 | Analytical Methods in Industrial Engineering | |
| F Engr 760 | Analytical Photogrammetry I | | or | | |
| | | | F Engr 761 | Analytical Photogrammetry II | |
| | | 18 | | | 15 |

1. *Mathematics through Math 328, or the equivalent, is required.
2. A total of 134 credit hours is required for the B.S. degree from the College of Forestry in this curriculum.

## LANDSCAPE ARCHITECTURE

Training in this curriculum develops ability in the planning of landscapes to secure the most desirable relationships among land forms, open space, structures, plantings and other elements to best serve utilitarian aims in an esthetically satisfying manner. The professional portion of the curriculum is primarily practice in design supported by study in construction and in plant materials. Other professionally-related courses are required and considerable opportunity is offered for electives in the sciences and the humanities.

The course of study is accredited by the American Society of Landscape Architects and is registered under the New York State law for licensure of landscape architects.

1. Chemistry 106 should be chosen by each student who has any uncertainty about continuing in the Landscape Architecture curriculum.
2. All Freshmen must complete the equivalent of College Algebra and Trigonometry; if qualified for further study more advanced mathematics may be taken in the first semester.

### *Electives*

1. At least one elective is to be chosen from each of categories A, B, and C.
   - A. Natural and Physical Sciences
     1. Botany 2. Entomology 3. Geology 4. Physics
     5. Zoology 6. Chemistry 7. Mathematics
     8. Silviculture
   - B. Social Sciences
     1. Economics 2. Geography 3. History
     4. Political Science 5. Sociology 6. Citizenship
     7. Psychology
   - C. Humanities
     1. Philosophy 2. Fine Arts 3. English
     4. Classical Languages 5. Romance Languages
     6. German 7. Religion
2. A PRIME ELECTIVE must be chosen and shall consist of a group of related courses and be pursued for a minimum of four semesters or twelve hours.
3. All elective choices are to be made with the assistance and approval of a departmental counselor.

# LANDSCAPE ARCHITECTURE CURRICULUM

## Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | Forest Botany | 4 | Geol 105 | Introductory Geology | 3 |
| Chem 106<br>or<br>Phys 103 | General Chemistry<br>General Physics | 4 | E I 111 | Principles of Land Use | 3 |
| Engl 101<br>or 103 | Basic Freshman English<br>Advanced Freshman English | 3 | Graph 181 | Graphics I | 2 |
| Math | | 3 | Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| Elective | | 3 | Pub Add 215 | Public Speaking | 3 |
| Phys Ed or ROTC | | 0 | Elective | | 3 |
| Orientation | | 0 | Phys Ed or ROTC | | 0 |
| | | 17 | | | 17 |

## Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 210 | Dendrology I | 2 | F Bot 260 | Shade Tree Pathology | 3 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| Graph 282 | Technical Drawing | 2 | Graph 283 | Graphics III | 2 |
| L A 220 | Basic Design I | 3 | L A 221 | Basic Design II | 3 |
| F Mgt 201 | Plane Surveying | 3 | L A 241 | Landscape Architectural Construction I | 3 |
| Elective | | 3 | Elective | | 3 |
| | | 15 | | | 16 |

Sophomore Summer: L A 231—Plant Materials I. Three weeks course in Plant Materials—3 credit hours. This course usually begins the last week of May, and is conducted at Farmingdale, New York.

## Junior Year

| | | | | | |
|---|---|---|---|---|---|
| E I 370 | History of Arts I | 3 | E I 371 | History of Arts II | 3 |
| Graph 380 | Pencil Technique | 1 | Graph 381 | Water Color | 1 |
| L A 320 | Landscape Design I | 6 | L A 321 | Landscape Design II | 6 |
| L A 330 | Plant Materials II | 2 | L A 331 | Plant Materials III | 2 |
| L A 340 | Landscape Architectural Construction II | 2 | L A 341 | Landscape Architectural Construction III | 2 |
| Elective | | 3 | Elective | | 3 |
| | | 17 | | | 17 |

## Senior Year

| | | | | | |
|---|---|---|---|---|---|
| E I 550 | Land Planning | 3 | E I 511 | Principles of Outdoor Recreation | 3 |
| L A 460 | Architecture I | 3 | L A 461 | Architecture II | 3 |
| L A 520 | Landscape Design III | 6 | L A 521 | Landscape Design IV | 6 |
| L A 540 | Landscape Architectural Construction IV | 2 | L A 541 | Landscape Architectural Construction V | 2 |
| Elective | | 3 | Elective | | 3 |
| | | 17 | | | 17 |

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1. A total of 136 credit hours is required.

## PAPER SCIENCE AND ENGINEERING

Two options are offered in this curriculum—one providing a broad education in the paper sciences, and the other a similar course of study but with more emphasis on chemical engineering.

### *Paper Science*

This program provides basic training in the physical sciences, mathematics, and engineering, combined with a specific understanding of the chemistry and anatomy of wood, pulping of wood, chemistry and physics of paper and paper formation, and the chemical engineering of pulp and paper processing. The option permits the student a range of elective courses with a choice between the sciences or management.

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1. *Mathematics through Math 227 or the equivalent, is required; it is recommended that students in this option also complete Math 328.
2. A total of 137 credit hours is required.

## PAPER SCIENCE & ENGINEERING CURRICULUM

## SCIENCE OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Bot 100 | Forest Botany | 4 |
| Chem 106 | General Chemistry | 4 |
| Engl 101<br>or 103 | Basic Freshman English<br>Advanced Freshman English | 3 |
| *Math | | 3 |
| Elective | | 3 |
| Phys Ed or ROTC | | 0 |
| Orientation | | 0 |
| | | 17 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| Graph 181 | Graphics I | 2 |
| Chem 116 | General Chemistry | 4 |
| Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| *Math | | 3 |
| Elective | | 3 |
| Phys Ed or ROTC | | 0 |
| | | 15 |

### Sophomore Year

| | | |
|---|---|---|
| *Math or Elective | | 3 |
| F Chem 221 | Organic Chemistry I | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 |
| Engl 210 | Advanced Composition and Literature | 2 |
| Phys 103 | General Physics | 4 |
| F Econ 290 | Introduction to Economics for Forestry | 3 |
| | | 16 |

| | | |
|---|---|---|
| *Math or Elective | | 3 |
| F Chem 223 | Organic Chemistry II | 3 |
| F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 211 | Technical Writing | 2 |
| Phys 104 | General Physics | 4 |
| Elective (Accounting preferred) | | 3 |
| | | 16 |

### Junior Year

| | | |
|---|---|---|
| F Chem 571 | Cellulose, Wood and Pulping Chemistry | 3 |
| Chem 346 | Physical Chemistry | 3 |
| Chem 347 | Physical Chemistry Lab | 1 |
| Chem 332 | Quantitative Analysis | 2 |
| Chem 333 | Quantitative Analysis Lab | 1 |
| PSE 300 | Introduction to the Pulp and Paper Industry | 1 |
| Elective | | 3 |
| Elective | | 3 |
| | | 17 |

| | | |
|---|---|---|
| WPE 388 | Wood Structure and Properties | 4 |
| Chem 356 | Physical Chemistry | 3 |
| Chem 357 | Physical Chemistry Lab | 1 |
| PSE 301 | Pulp and Paper Processes | 3 |
| PSE 302 | Paper Processes Lab | 1 |
| PSE 570 | Principles of Mass and Energy Balance | 3 |
| Elective | | 3 |
| | | 18 |

SUMMER MILL EXPERIENCE: PSE 304—Mill Experience—5 credit hours. Twelve weeks full-time pulp or paper mill employment approved by the Department between the Junior and Senior years.

### Senior Year

| | | |
|---|---|---|
| A M 565 | Introduction to Computer Programming | 3 |
| F Chem 573 | Cellulose and Wood Chemistry Lab | 1 |
| PSE 571 | Pulp and Paper Unit Operations I | 3 |
| PSE 561 | Pulping Technology | 3 |
| PSE 565 | Paper Properties | 5 |
| Elective | | 3 |
| | | 18 |

| | | |
|---|---|---|
| PSE 573 | Pulp and Paper Unit Operations II | 3 |
| PSE 566 | Paper Coating | 3 |
| PSE 568 | Papermaking Processes | 3 |
| PSE 556 | Economics of Pulp and Paper | 3 |
| Elective | | 3 |
| | | 15 |

### *Paper Engineering*

A student may earn a chemical engineering degree in one year following the completion of this option. This program is designed to provide a basic education in the physical sciences, and mathematics, with emphasis on chemical engineering. Courses include fundamental studies in wood chemistry, wood anatomy, pulping, and the chemistry and physics of paper and paper formation.

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1. *Mathematics through Math 328 or the equivalent, is required; it is recommended that students in this option also complete Math 585.
2. A total of 137 credit hours is required.

## PAPER SCIENCE & ENGINEERING CURRICULUM

## ENGINEERING OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | Forest Botany | 4 | Graph. 181 | Graphics I | 2 |
| Chem 106 | General Chemistry | 4 | Chem 116 | General Chemistry | 4 |
| Engl 101<br>or 103 | Basic Freshman English<br>Advanced Freshman English | 3 | Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| Orientation | | 0 | | | |
| | | 17 | | | 15 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| F Econ 290 | Introduction to Economics for Forestry | 3 | Elective | (Accounting preferred) | 3 |
| | | 16 | | | 16 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 571 | Cellulose, Wood and Pulping Chemistry | 3 | WPE 388 | Wood Structure and Properties | 4 |
| Chem 346 | Physical Chemistry | 3 | Chem 356 | Physical Chemistry | 3 |
| Chem 347 | Physical Chemistry Lab | 1 | Chem 357 | Physical Chemistry Lab | 1 |
| Chem 332 | Quantitative Analysis | 2 | PSE 301 | Pulp and Paper Processes | 3 |
| Chem 333 | Quantitative Analysis Lab | 1 | PSE 302 | Paper Processes Lab | 1 |
| PSE 300 | Introduction to the Pulp and Paper Industry | 1 | PSE 570 | Principles of Mass and Energy Balance | 3 |
| Elective | | 3 | Elective | | 3 |
| Elective | | 3 | | | |
| | | 17 | | | 18 |

SUMMER MILL EXPERIENCE: PSE 304—Mill Experience—5 credit hours. Twelve weeks full-time pulp or paper mill employment approved by the Department between the Junior and Senior years.

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| A M 565 | Introduction to Computer Programming | 3 | PSE 573 | Pulp and Paper Unit Operations II | 3 |
| PSE 571 | Pulp and Paper Unit Operations I | 3 | PSE 566 | Paper Coating | 3 |
| PSE 561 | Pulping Technology | 3 | PSE 568 | Papermaking Processes | 3 |
| PSE 565 | Paper Properties | 5 | Chem Engr 551 | Chemical Engineering Thermodynamics I | 3 |
| PSE 577 | Process Control for the Paper Industry | 3 | PSE 574 | Pulp and Paper Unit Operations Lab II | 3 |
| PSE 572 | Pulp and Paper Unit Operations Lab I | 1 | | | |
| | | 18 | | | 15 |

## RESOURCES MANAGEMENT

This is the central, accredited forestry educational program of the College. The objectives of this curriculum are (1) to provide a general and well-integrated education for professional practice as foresters and land managers, and (2) to open a broad array of natural resource-related opportunities for the individual student to pursue his own interests and abilities in particular endeavors or through advanced study.

The core of required courses presents the principles and practices basic to sound management of extensive nonurban land areas for their many values in producing timber, wildlife, water, esthetic and recreational uses. Over a third of our nation's area is forest land. The relationships of these valuable resources to modern society's needs and to the quality of our living are critical and increasing in importance. The core assures fulfillment of education requirements for all initial professional positions in federal and state forestry, as well as the normal requirements of industrial and private enterprises in land management. Extensive elective courses serve to broaden the student's general education, to strengthen his perceptions and integration of knowledge, or to provide a solid base for those planning graduate study in resources management or its specialties.

The curriculum offers broad opportunity and maximum credit for students interested in transferring from liberal arts or science programs in community colleges or other universities.

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1. *Six credit hours of mathematics are required: at least algebra and trigonometry.
2. **At least one of the following three courses must be chosen from these electives: F Bot 560—Forest Pathology, Silvi 351—Meteorology and Fire Behavior, F Zool 350—Principles of Wildlife Management.
3. Two semesters of calculus are highly recommended to be taken prior to the Junior Year, particularly for students interested in graduate work.
4. Three elective courses (totalling 9 credits) must be selected from forestry and allied subject areas.
5. Three elective courses (totalling 9 credits) must be selected from the Humanities and Social Science areas with at least one course from each area.
6. Additional electives should be chosen from the Humanities and Social Science areas or from natural and physical sciences not directly related to the student's course of study.
7. A total of 137 credit hours is required.

# RESOURCES MANAGEMENT CURRICULUM

## Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | Forest Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 4 | Chem 116 | General Chemistry | 4 |
| Engl 101<br>or 103 | Basic Freshman English<br>Advanced Freshman English | 3 | Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| Orientation | | 0 | | | |
| | | 17 | | | 17 |

## Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 210 | Dendrology I | 2 | F Bot 211 | Dendrology II | 1 |
| Graph 280 | Technical Drawing | 1 | F Econ 300 | Introduction to Macro-Economics | 3 |
| F Mgt 201 | Plane Surveying | 3 | Geol 105 | Introductory Geology | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| Elective | | 3 | Elective | | 3 |
| Elective | | 3 | Elective | | 3 |
| | | 16 | | | 17 |

SUMMER SESSION IN FIELD FORESTRY
5 weeks—6 credit hours: Required of all students following the Sophomore year and prior to registration for the Junior Year (including Junior year transfer students who elect this curriculum).

| | | |
|---|---|---|
| F Biol 301 | Field Biology | 1 |
| F Mgt 303 | Introduction to Forest Measurements | 1 |
| Silvi 302 | Silvics | 1 |
| Res Mgt 304 | Silviculture—Resource Management | 3 |
| | | 6 |

## Junior Year

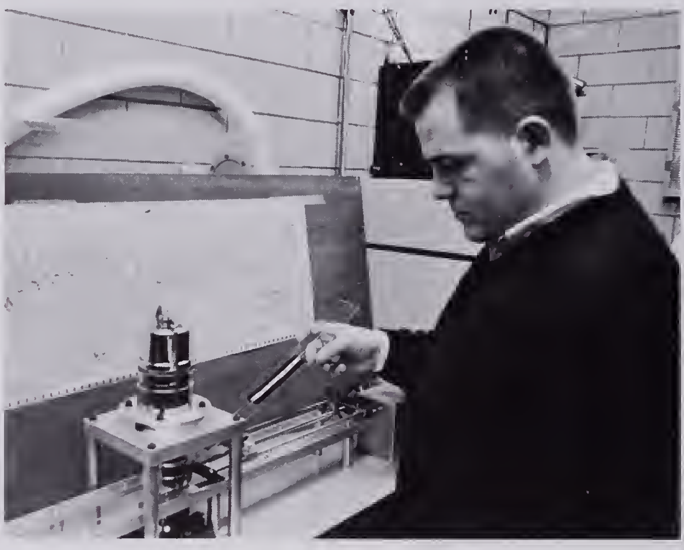
| | | | | | |
|---|---|---|---|---|---|
| A M 571<br>or<br>A M 591 | Introduction to Statistical Analysis<br>Introduction to Probability and Statistics | 3 | F Mgt 522 | Mensuration | 3 |
| F Bot 330 | Plant Physiology | 2 | F Ento 300 | Principles of Forest Entomology | 2 |
| F Econ 301 | Introduction to Micro-Economics | 3 | F Mgt 340 | Harvesting | 2 |
| Silvi 332 | Soils | 2 | Silvi 521 | Principles of Silviculture | 3 |
| Silvi 333 | Soils Lab | 1 | WPE 304 | Introduction to Forest Products | 2 |
| Elective | | 3 | Elective | | 3 |
| Elective | | 3 | | | 15 |
| | | 17 | | | |

## Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Econ 510 | Principles of Forestry Economics | 3 | E I 511<br>or<br>Silvi 540 | Principles of Land Use<br>Principles of Watershed Management | 3 |
| F Mgt 554 | Forest Administration and Policy | 3 | F Mgt 552 | Management Planning and Operations | 3 |
| Silvi 524 | Practices of Silviculture | 3 | Res Mgt 502 | Resources Management | 3 |
| WPE 486 | Elementary Wood Technology | 2 | **Electives | | 6 |
| **Electives | | 6 | | | |
| | | 17 | | | 15 |

## WOOD PRODUCTS ENGINEERING

Three options are available in this curriculum: Wood Science, Production Engineering, and Materials Marketing.



### *Wood Science*

This option provides an opportunity for students to obtain the necessary scientific background for research and development in wood-related industries, or for graduate study leading to fundamental research and/or college teaching.

Because of the breadth of wood science, and in order to accommodate the particular needs or interests of students, two areas of emphasis are provided within the option. Those students primarily interested in the biological approach in studying wood, and in its development in the living tree, will concentrate in the anatomical or biophysical aspects of wood science. Those interested particularly in physical wood science will emphasize the basic physical sciences. In either case, at least nine credit hours of elective courses should be taken in the humanities and social sciences.

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1. *It is recommended that at least 9 credit hours of these electives be in the Social Sciences or Humanities.
2. A total of 131 credit hours is required.
3. Articulation Note: In acquiring full Junior status, it is necessary for the Transfer Student to have completed organic chemistry (2 semesters), physics (2 semesters), and calculus (3 semesters). Any deficiencies in botany and zoology may be made up during the Junior year.

# WOOD PRODUCTS ENGINEERING CURRICULUM

## WOOD SCIENCE OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Bot 100 | Forest Botany | 4 |
| Chem 106 | General Chemistry | 4 |
| Engl 101<br>or 103 | Basic Freshman English<br>Advanced Freshman English | 3 |
| Math 125 | Elementary Analytic Geometry | 3 |
| Elective | | 3 |
| Phys Ed or ROTC | | 0 |
| Orientation | | 0 |
| | | 17 |

| *Semester Second* | | *Hours Credit* |
|---|---|---|
| F Zool 100 | General Zoology | 4 |
| Chem 116 | General Chemistry | 4 |
| Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| Math 226 | Differential Calculus | 3 |
| Graph 181 | Graphics I | 2 |
| Phys Ed or ROTC | | 0 |
| | | 16 |

### Sophomore Year

| | | |
|---|---|---|
| F Chem 221 | Organic Chemistry I | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 |
| Engl 210 | Advanced Composition and Literature | 2 |
| Math 227 | Integral Calculus | 3 |
| Phys 103 | General Physics | 4 |
| F Econ 290 | Introduction to Economics for Forestry | 3 |
| | | 16 |

| | | |
|---|---|---|
| F Chem 223 | Organic Chemistry II | 3 |
| F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 211 | Technical Writing | 2 |
| Math 328 | Topics in Calculus | 3 |
| Phys 104 | General Physics | 4 |
| WPE 388 | Wood Structure and Properties | 4 |
| | | 17 |

### Junior Year

| | | |
|---|---|---|
| Chem 346 | Physical Chemistry | 3 |
| WPE 322 | Mechanical Processing | 3 |
| F Bot 210 | Dendrology I | 2 |
| A M 591 | Introduction to Probability and Statistics | 3 |
| Wood Anatomy Sub-option:<br>F Biol 330<br>Wood Physics Sub-option:<br>A M 565 | <br>Principles of General Physiology<br><br>Introduction to Computer Programming | 3 |
| *Elective | | 3 |
| | | 17 |

| | | |
|---|---|---|
| Chem 356 | Physical Chemistry | 3 |
| WPE 526 | Fluid Treatments | 3 |
| WPE 520 | Polymeric Adhesives and Coatings | 3 |
| WPE 502 | Timber Mechanics | 4 |
| *Elective | | 3 |
| | | 16 |

WPE 390—Field Trip—2 credit hours. A two-week field trip at the end of the Junior Year.

### Senior Year

| | | | |
|---|---|---|---|
| WPE 522 | Composite Materials | | 3 |
| Wood Anatomy Sub-option: | | | |
| WPE 585 | Microtechnique and Photomicrography | (3) | 6–7 |
| Phys 261 | Introduction to Modern Physics | (3) | |
| Wood Physics Sub-option: | | | |
| M E 225 | Engineering Mechanics | (4) | |
| F Chem 556 | Polymer Properties | (3) | |
| WPE 566 | Wood-Water Relationships | | 3 |
| *Electives | | | 2–3 |
| | | | 15 |

| | | | |
|---|---|---|---|
| WPE 498 | Research Problem | | 3 |
| Wood Anatomy Sub-option: | | | 6 |
| WPE 588 | Commercial Timbers of the World | (3) | |
| F Bot 585 | Plant Anatomy | (3) | |
| Wood Physics Sub-option: | | | |
| M E 226 | Engineering Mechanics | (3) | |
| F Chem 520 | Nuclear Chemical Techniques | (3) | |
| *Electives | | | 6 |
| | | | 15 |

### *Production Engineering*

The goal of this option is to provide an education in the areas of process development, plant design, and production management of modern industries utilizing wood, its plastic and other composites, and related raw materials.

The program establishes a solid foundation in basic sciences and in applied mathematics, including computer programming and engineering statistics. On this is built a sequence of studies in engineering and management sciences essential to planning and development of production processes, and to design and operation of modern manufacturing facilities.

Modern production plants are complex systems of machines, men, money, and management, integrated for production in highly competitive markets. The graduates of this option must be familiar with planning, design, operation, and the economics of entire systems.

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1. *Transfer students may substitute General Biology or Zoology, either 3 or 4 Cr. Hrs.
2. **Transfer students may substitute Social Sciences or Humanities, or General Biology.
3. ***It is recommended that students elect at least 9 Cr. Hrs. from the Social Sciences or the Humanities.
4. A total of 130 Credit Hours is required.
5. Articulation note: 2 Yr. SUNY Engineering Science students come in as full Juniors. Other transfer students must have completed physics (2 semesters) and calculus (3 semesters) before acquiring full Junior status. Any deficiencies in Botany or Zoology may be made up during the Junior year.

# WOOD PRODUCTS ENGINEERING CURRICULUM
## PRODUCTION ENGINEERING OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| *F Bot 100 | Forest Botany | 4 | **F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 4 | Chem 116 | General Chemistry | 4 |
| Engl 101<br>or 103 | Basic Freshman English<br>Advanced Freshman English | 3 | Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| Math 125 | Elementary Analytic Geometry | 3 | Math 226 | Differential Calculus | 3 |
| ***Elective | | 3 | Graph 181 | Graphics I | 2 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| Orientation | | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| Acct 251 | Elementary Accounting | 3 | Acct 252 | Elementary Accounting | 3 |
| F Econ 290 | Introduction to Economics for Forestry | 3 | WPE 388 | Wood Structure and Properties | 4 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| Math 227 | Integral Calculus | 3 | Math 328 | Topics in Calculus | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| | | 15 | | | 16 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 322 | Mechanical Processing | 3 | WPE 502 | Timber Mechanics | 4 |
| A M 565 | Introduction to Computer Programming | 3 | WPE 520 | Polymeric Adhesives and Coatings | 3 |
| A M 591 | Introduction to Probability and Statistics | 3 | WPE 526 | Fluid Treatments | 3 |
| M E 225 | Engineering Mechanics | 4 | M E 226 | Engineering Mechanics | 3 |
| ***Elective | | 3 | I E 548 | Engineering Economic Analysis | 3 |
| | | 16 | | | 16 |

WPE 390—Field Trip—2 credit hours. A two-week field trip at the end of the Junior Year.

SUMMER EXPERIENCE: 2 months experience in an approved wood products or allied firm or laboratory is required. A written report, to be presented in WPE 497, is required. Usually fulfilled between the Junior and Senior Years.

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| E E 221 | Electrical Science I | 3 | E E 222 | Electrical Science II | 3 |
| I E 575 | Industrial Methods and Systems Engineering | 3 | WPE 572 | Production Management of Wood Working Industries II | 3 |
| M E 351 | Fundamentals of Thermodynamics I | 3 | WPE 498 | Research Problem | 3 |
| WPE 570 | Production Management of Woodworking Industries I | 3 | ***Electives | | 6 |
| WPE 522 | Composite Materials | 3 | | | |
| WPE 497 | Senior Seminar for Wood Products Engineering Majors | 2 | | | |
| | | 17 | | | 15 |

### *Materials Marketing*

The marketing of wood products, with their related materials and services, brings together the essential elements of production, distribution, and consumption of our major renewable material resource. Preparation for successful marketing involves development of basic knowledge of the materials and their properties, their efficient processing and fabrication, and the effective use of their products. Because marketing channels vary widely in nature, size, and complexity to meet the equally varied needs of commercial, industrial, and consumer markets, preparation must also include the sound general business orientation required of any segment of the economy.

This option is designed to educate students for professional careers in technical sales and management of distributive enterprise in the wood products and allied industries.

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1. *Those students certain of their interest in continuing in the Materials Marketing Option, should take F Econ 290 and Graphics 280 in place of F Bot 100. Those taking F Bot 100 will be required to take F Econ 290 and Graphics 280 in place of elective courses later in their program.
2. **Mathematics requirements include Math 125, Analytic Geometry, and Business Statistics 261 or equivalents. College Algebra and Trigonometry may be taken in the Freshman year prior to completion of these mathematics requirements in the Sophomore year.
3. ***Electives are to be from the Humanities or the Social Sciences.
4. A total of 128 credit hours is required.
5. Articulation note: Any student who has completed the 1st 2 years of college, provided he has taken 2 semesters of general chemistry, analytic geometry and 2 semesters of physics, may transfer in at full Junior status.

# WOOD PRODUCTS ENGINEERING CURRICULUM
## MATERIALS MARKETING OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| *F Bot 100 | Forest Botany | 4 | Pub Add 215 | Public Speaking | 3 |
| Chem 106 | General Chemistry | 4 | Chem 116 | General Chemistry | 4 |
| Engl 101<br>or 103 | Basic Freshman English<br>Advanced Freshman English | 3 | Engl 102<br>or 104 | Basic Freshman English<br>Advanced Freshman English | 3 |
| **Math or Elective | | 3 | **Math or Elective | | 3 |
| ***Elective | | 3 | ***Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| Orientation | | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| Acct 251 | Elementary Accounting | 3 | Acct 252 | Elementary Accounting | 3 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| **Math or Elective | | 3 | **Math or Elective | | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| ***Elective | | 3 | WPE 388 | Wood Structure and Properties | 4 |
| | | 15 | | | 16 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 322 | Mechanical Processing | 3 | WPE 520 | Polymeric Adhesives and Coatings | 3 |
| A M 565 | Introduction to Computer Programming | 3 | WPE 526 | Fluid Treatments | 3 |
| Fin 355 | Money and Banking | 3 | Bus Law 355 | Basic Concepts and Applications | 3 |
| Mktg 355 | Marketing Principles, Methods, and Problems | 3 | Mktg 356 | Distribution Management | 3 |
| ***Elective | | 3 | ***Elective | | 3 |
| | | 15 | | | 15 |

WPE 390—Field Trip—2 credit Hours. A two-week field trip at the end of the Junior Year.

SUMMER EXPERIENCE: 2 months experience in an approved wood products or allied firm or laboratory is required. A written report, to be presented in WPE 497, is required. Usually fulfilled between the Junior and Senior Years.

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 522 | Composite Materials | 3 | WPE 544 | Materials Marketing | 3 |
| WPE 497 | Senior Seminar for Wood Products Engineering Majors | 2 | F Econ 520 | Economics of Wood-Using Industries | 3 |
| WPE 442 | Light Construction | 3 | Bus Adm 246 | Management Process | 3 |
| Bus Law 357 | The Law of Contracts | 3 | Fin 356 | Corporation Finance | 3 |
| WPE 402 | Elementary Timber Mechanics | 3 | ***Elective | | 3 |
| ***Elective | | 3 | | | 15 |
| | | 17 | | | |

# VI

# SUMMER SESSIONS

A wide array of courses at the undergraduate and graduate levels are available to College of Forestry students in the Syracuse University summer sessions. Research problem, thesis, and special courses regularly available at the College may be taken also during the summer sessions. Syracuse University courses taken must be related directly to the student's planned program and be approved by his faculty advisor.

*Transfer students* are advised to review their special course needs with the Office of Admissions and to consider summer session attendance where completions of background courses in mathematics, chemistry, economics, or general education subjects are necessary for fall semester entry in full standing. These courses may be taken at any accredited institution. Summer session tuition charges at the College are at the rate of $13.50 per credit ($20.00 for out-of-state residents) for undergraduate courses and $20.00 per credit for graduate courses. Information on courses to be offered, session dates, and registration procedures are available upon request from the Office of Student Services or the Office of Graduate Studies at the College.

## Summer Sessions in Field Forestry at the Charles Lathrop Pack Demonstration Forest, Warrensburg, New York

A five-week (6-credit) program of courses emphasizing the field application of forestry principles and practices is conducted in two sessions each summer at the Pack Demonstration Forest near Warrensburg, New York. These sessions are coordinated with College and Syracuse University summer sessions, permitting students to attend an on-campus session and a field session in the same summer. The courses presented in the Field Forestry program are listed in both the Forest Biology and Resources Management curricula sections. Room, board, and fee charges approximating $160 are levied. No tuition charge is made for matriculated students since the courses in this session are coordinated with and considered an integral part of the fall semester of the Junior year. *Transfer students* planning to enroll in either the Resources Management or Forest Biology curriculum should write to the Director, Summer Session in Field Forestry at the College for additional information on session dates and special requirements.

Completion of the Field Forestry program is required of students in Resources Management prior to the fall term of their Junior year. Students in Forest Biology are also required to attend this session or the session at Cranberry Lake Biology Station, although attendance at other approved biological field stations may be arranged with the Curriculum Director.

### Summer Session in Environmental Biology at the Cranberry Lake Biology Station, Cranberry Lake, New York

A summer instructional program in environmental biology is available with emphasis on upper and graduate level instruction in forest and fresh water ecosystems. The program is jointly sponsored by the College's Division of Biological Sciences and the Department of Biological Sciences at the State University of New York at Albany. The sessions are held at the College's teaching and research facilities at Barber Point which is a part of the Pack Experimental Forest, bordering Cranberry Lake. The 8-week instructional program consists of two levels of coordinated courses of 4 and 8 weeks duration. Attendance at either or both sessions may be arranged. Courses grouped by level and session are as follows:

| *Number* | *Title* | *Credits* | *Duration & Session* |
|---|---|---|---|
| | *Upper level courses* | | |
| F.Bio. 521 | Ecology of Freshwaters | 2 | 4 weeks I |
| F.Bot. 522 | Ecology of Forest Communities | 2 | 4 weeks II |
| F.Zoo. 523 | Invertebrate Ecology | 2 | 4 weeks I |
| F.Zoo. 524 | Vertebrate Ecology | 2 | 4 weeks II |
| F.Bot. 517 | Adirondack Flora | 2 | 8 weeks, I & II |
| F.Bio. 498 | Research Problem in Biology | 1–3 | 8 weeks, I & II |
| | *Graduate level courses* | | |
| F.Bio. 515 | Advanced Limnology | 4 | 8 weeks, I & II |
| F.Ento. 550 | Forest & Aquatic Insects | 2 | 4 weeks, II |
| F.Bot. 527 | Bryoecology | 2 | 4 weeks, I |
| F.Bio. 997 | Biology Seminar | TBA | 8 weeks, I & II |
| F.Bot. 798 | Research in Forest Botany | TBA | 8 weeks, I & II |
| F.Zool. 798 | Research in Forest Zoology | TBA | 4 weeks, I |
| F.Ento. 798 | Research in Forest Entomology | TBA | 4 weeks, II |
| F.Biol. 722 | Bioclimatology | 2 | 4 weeks, II |

Graduate level courses are offered on an alternate year basis. Total credit load is limited to a maximum of 4 credits per session or a maximum of 8 credits in both sessions.

Tuition charges are $13.50 per credit for undergraduate courses and $20.00 per credit for graduate courses. Non-New York residents are charged $20.00 per credit. Forestry students register at the College for the sessions. Others register through the Albany campus. An additional charge of an estimated $200.00 for the full session or $100.00 for a 4-week session is levied for room and board. Further information on the program may be obtained by writing to Director, Cranberry Lake Biology Station, Department of Biology, State University of New York at Albany, or Associate Director, Cranberry Lake Biology Station, Department of Forest Botany at the College of Forestry.

# VII

# GRADUATE STUDY

The stimulating interaction of faculty and students working together to understand and solve today's challenging problems creates the major background for graduate study at the College. A wide array of excellent supporting facilities and equipment completes the setting for creative study. In this environment the student takes a concentrated program of advanced courses designed to meet his professional and academic objectives as a prelude to original investigation. Participation in seminars and colloquia with faculty and visiting scholars further expands his intellectual horizons. Graduate study culminates in individual research and creative achievement.

During the graduate years a student develops his ability to think critically and analytically, to design experiments and plan research, to work effectively with the basic research tools as well as with specialized equipment, and to accept the rigorous discipline of purposeful study toward a specific goal. It is a time of discovery and excitement, of answers and new insights — the realization of personal creativity and the deep satisfaction of scholarship.

The demand by industry, government, and educational organizations for scientists and scholars whose studies have centered in forest resources, their products, and supporting science disciplines, is increasing rapidly. Education through the doctorate is generally expected of those planning to enter college or university teaching. The Master's or Doctor's degree is a requirement for many industrial or governmental research positions and increasing numbers of employers are seeking graduates with one or more advanced degrees for managerial positions. But a graduate education is more than a positional requirement. Our society is increasingly in the hands of men who have broad foresight and reasoned judgment in applying sociological and technical knowledge to guide human and environmental forces. Modern civilization requires men who can think objectively and constructively, and who can act creatively and responsibly. Such men are especially needed in the development and guidance of natural resources toward man's future betterment.

## RESEARCH

Graduate education and research are so mutually dependent upon each other, that they must be considered together for a realistic understanding of the College's program. Research is a major responsibility of the College required by its charter, and has been traditionally an integral part of its total academic effort.

The objectives of the College in carrying out a vigorous research program are to provide education in science and technology; to provide an environment for professional growth, the development of creative thought, and the mastery of investigative techniques; and to create new knowledge, providing a growing resource of information for the people of New York and the nation for the better management, use and enjoyment of natural resources and their many products. The latter objective constitutes an obligation and responsibility of the College, as a publicly supported professional institution, relating to our great forest resources.

To support these objectives and obligations the State University of New York provides a budget for Organized Research which is currently about $750,000 annually. In addition, extra-mural research support in the form of grants and contracts amounts to over $1,000,000 annually. This extra-mural support comes from National Science Foundation, Department of Defense, National Institutes of Health, the McIntire-Stennis Program of the U.S.D.A., the U. S. Forest Service, New York Conservation Department, other government agencies, private foundations and industry.

Much graduate student research work is directly related to continuing programs of faculty research, and in many cases graduate students receive financial assistance from these programs.

Several research institutes and centers have been established at the College to promote research. These include the Empire State Paper Research Institute (supported by 45 companies in 12 countries), the Cellulose Research Institute, the State University Water Resources Center, the State University Polymer Research Center, the Applied Forestry Research Institute, and the Office of International Forestry. The United States Forest Service cooperates with the College through the Cooperative Watershed Management Research Unit and the Cooperative Forest Recreation Research Unit. In each of these cooperative units Forest Service personnel are assigned to the College and work directly with the faculty and graduate students in developing research programs.

## POST-DOCTORAL OPPORTUNITIES

Advanced education and experience opportunities for professional people and scientists are abundant at the College. From 25 to 30 Post-Doctoral Fellows and Associates are in residence each year to receive advanced research experience or professional education under the guidance of faculty members with international stature. Modern facilities and instrumentation help to make the program meaningful and rewarding.

## GRADUATE DEGREES

The College of Forestry offers graduate education in professional and scientific fields leading to Master of Science, Master of Forestry, Master of Landscape Architecture, and the Doctor of Philosophy degrees.

## GRADUATE PROGRAMS

Graduate education may be pursued at the College in each of the 10 academic fields. Also there are wide opportunities for interdepartmental and interdisciplinary programs since the faculty of the departments cooperate in executing research, in planning graduate programs, and in teaching courses. Interested students should review the descriptions of all programs related to their field of interest to get a clear picture of the wide range of graduate education available within the College. In addition, they should keep in mind that the great variety of course offerings at Syracuse University and the State University Upstate Medical Center are also available. This arrangement means that graduate students at the College work intimately with a distinguished faculty, in a small campus environment, and yet have all of the educational and social advantages of a large university complex at their disposal.

The descriptions which follow should be reviewed in relation to the following administrative divisions:

***Resources Management Division***

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Department of Forestry Economics .......................... 70
Department of Forest Management .......................... 71
Department of Silviculture .......................... 72

***Biological Sciences Division***

Department of Forest Botany and Pathology .......................... 73
Department of Forest Entomology .......................... 75
Department of Forest Zoology .......................... 76

**Physical Sciences Division**

Department of Forest Chemistry .......................... 77
Department of Paper Science & Engineering .......................... 78
Department of Wood Products Engineering .......................... 79

***School of Landscape Architecture*** .......................... 80

***Interdepartmental and Interdisciplinary Programs***

World Forestry .......................... 83
Organic Materials Science .......................... 82
Water Resources .......................... 84
Forest Land Use and Regional Planning .......................... 82
Forest Soils .......................... 82
Chemical Ecology .......................... 82
Forest Recreation .......................... 82

## FORESTRY ECONOMICS

Duerr, *Chairman* (Managerial economics, resource and market analysis); Armstrong (Industry economics, resource and market analysis); Bennett (Economic theory, economic thought in forestry); Christiansen (Forest production economics, economic systems analysis); Miller (Regional economics, economics of consumption); Petriceks (Macro-economics, international forestry economics):

Graduate study emphasizing the economic aspects of forestry is offered by the Department in programs leading to Master's and Doctor's degrees. The Master's program is designed to meet the needs of the graduate forester or forest products technologist and also serve the graduate in liberal arts, engineering or business whose interests point toward the economics of forest resource management. The aim is to broaden understanding of forestry economics with opportunity for some depth of penetration into a relevant specialization.

The Doctoral program is for those who wish to make a career as professional forestry economists in research institutions, in the academic world, or in business or government. Specialized understanding of the discipline is sought in reference to creating and utilizing forest resources to their fullest extent. Requirements are similar to those in economics graduate programs at many leading universities, with the concentration directed to the economics of forestry.

Whatever the program, the basic purpose is to help the student acquire the tools and facility for disciplined, logical, critical and constructive thinking in his approaches to economic understanding, and for expressing his thoughts clearly and accurately.

Course work offered at the College of Forestry is supplemented by the wide range of course available in the Maxwell Graduate School of Citizenship and Public Affairs, the College of Business Administration, and other units of Syracuse University. Individual programs may draw upon supporting courses in general economics, mathematics and statistics, operations research, business, international affairs, or related fields. The substantial library resources, computer facilities, and other resources of Syracuse University are also available to the graduate student along with those of the College.

Graduate research within the Department covers a broad spectrum. Examples of topics recently treated are: application of economic systems and operations research in timber management and in the manufacture and marketing of forest products; forestry investments in the face of uncertainty; economic models for public forestry decision-making; history of economic thought in forestry, the financing of public recreational improvements; and forestry investment criteria in newly-developing nations.

## FOREST MANAGEMENT

GETTY, *Chairman* (Forest Policy, Administration, Managerial Processes); BICKFORD (Statistics, Inventory and Research Design); BROCK (Analytical and Interpretive Photogrammetry); CUNIA (Operations Research, Mensuration); GRAVES (Resources Planning and Management, Man-Resource Relations); HORN (Business Management, Law and Legal Aspects); KOTEN (Management Analysis, Forest Engineering); KASILE (Statistics, Experimental Design); LANCKTON (Remote Sensing, Photogrammetry); LEE (Director of College Computer Center, Systems Analysis and Engineering); PALMER (Industrial Engineering and Management); SHAFER (Forest Recreation Research); STANTON (Photogrammetry, Geodesy); TULLY (Structural Design, Hydrology, Soil Mechanics); WENGER (Recreation, Research Methods):

The graduate program in the Department offers wide opportunity for either specialization or breadth in advanced study. The faculty foster a spirit of individual initiative and free inquiry into all aspects of managerial concerns. Joint programs are common, aiming at strength and balance with relevant knowledge offered in other departments and disciplines. Graduates from various fields of study are encouraged to apply. Five major areas of concentration outlined below permit a student to prepare himself in considerable depth, but flexibility, integration, and broader understanding also are encouraged.

A *Management* program prepares graduates for the field of administration or management in a public agency or a business at the executive, planning, budgeting, programming, or operating levels. The wide choices of courses in other departments of the College and in the many Colleges of Syracuse University, including the renowned Maxwell Graduate School of Citizenship and Public Affairs and the College of Business Administration, are used to supplement the Department's offerings. This enables the student to earn a Master's degree which is the forestry or natural resources equivalent of a Master of Business Administration or Master of Public Administration degree. The Ph.D. program is scientifically oriented and strongly supported by courses in the behavioral sciences to develop the talents needed in top executive leadership in the rapidly developing fields of man-resources relationships and management sciences. Interested graduates from business and other colleges are encouraged.

Forest *Mensuration* and *Biometrics* is a more concentrated program that offers highly sophisticated courses in mensuration and operations research, as well as all phases of statistics and statistical design, leading to the Master's and Doctor's degrees. The course work and research, directed by internationally known specialists in forest mensuration and statistics, constitute an exceptionally strong program.

A third program emphasizes *Photogrammetry*, either as a specialization or in conjunction with management. Individually designed Master's or Doctor's programs are available in Analytical Photogrammetry, Photogrammetric Systems, and Photo Interpretation and Remote Sensing. Graduates with B.S. degrees in forestry or in engineering, geology, physics, or mathematics readily qualify for graduate study in Photogrammetry.

Forest *Recreation* is a fourth major program of graduate study and research offered by the Forest Management Department. Either specialized inquiry or complex synthesis and insight may be pursued, for which elective support may be drawn from other departments such as Landscape Architecture, Economics, Silviculture, and Zoology. Syracuse University courses in sociology, psychology, philosophy, journalism, physical education and related fields offer strong support for the student preparing seriously for Recreation. Of special significance is the Recreation Research Branch of the Northeastern Forest Experiment Station of the U. S. Forest Service located at the College of Forestry. Its Director and several professional recreation researchers in residence at the College serve as adjunct faculty in the Forest Management Department. Both Master's and Ph.D. candidates are presently matriculated in this program. There is great employment opportunity for many more people with advanced degrees in this field. Interested graduates with a B.S. degree in rural sociology, psychology, urban planning, political science, business or public administration qualify for this program by including sufficient forestry study in their graduate program to provide a natural-resources background.

The *Forest Engineering* program in the Department is articulated closely with course offerings of the Civil Engineering Department and the Industrial Engineering Department of Syracuse University. This Master's program offers a unique opportunity for graduates with a B.S. degree in Forestry to obtain advanced preparation in the engineering components of resources management, based on the fundamentals of civil and industrial engineering, systems analysis, computer science, and management science.

## SILVICULTURE

FARNSWORTH, *Chairman* (Silviculture); BERGLUND (Silvics); BLACK (Watershed Management); CRAUL (Forest Soil Physics); ESCHNER (Forest Influences); HERRINGTON (Meteorology); LEA (Director, Summer Field Session, and Silviculture); LEAF (Forest Soils Fertility); LEONARD (Watershed Management); RICHARDS (Reforestation):

Graduate study in all aspects of silviculture, and its supporting sciences, is available. Emphasis can be placed on fundamental biological relationships or on applications of these relationships in the forest. Programs are coordinated with other areas of specialization through cooperation between the Department, other departments of the College, Syracuse University, and the U. S. Forest Service Watershed Management Research Unit. A major strength is the close association of scientists representing a broad spectrum of specialists, stimulating intra- and interdisciplinary cooperation.

Graduate emphasis may be directed to silvics, silviculture, forest stand development, forest influences and watershed management, forest tree genetics and tree improvement, forest meteorology and climatology, forest soil physics and forest soil fertility-nutrition, and site relations. Well-equipped laboratories, specialized equipment and greenhouse facilities are available to graduate students.

Extensive College forests of nearly 22,000 acres include most forest types of the northeast, as well as plantations, seed orchards, and a tree nursery, all of which offer exceptional opportunities for field study under a wide variety of environments. Major field installations include long-term northern hardwood stand improvement studies, the oldest continuously studied forest fertilization trials in the United States, and two large micro-climatic tower complexes with associated automated data acquisition systems and instrumentation.

## FOREST BOTANY AND PATHOLOGY

TEPPER, *Chairman* (Anatomy and Morphogenesis); GRIFFIN (Mycology and Fungus Physiology); KETCHLEDGE (Ecology and Bryology); LOWE (Mycology); MANION (Pathology); MCDOWELL (Fungus Physiology); MORRISON (Taxonomy); SCHAEDLE (Physiology); SILVERBORG (Pathology); VALENTINE (Genetics); WANG (Mycology); WILCOX (Physiology of Growth and Development); ZABEL (Wood Deterioration).

The program in botany and pathology is designed to provide students with a course of instruction in basic botanical and related natural and physical sciences. Research and thesis problems are generally designed to utilize forest organisms in the development of biological knowledge. Graduate programs are offered in the fields of anatomy and morphogenesis, physiology, ecology, forest pathology, wood deterioration, mycology, genetics and taxonomy. Minors may be taken as soils, wood chemistry, biochemistry, and wood engineering. Strong supporting courses in bacteriology, microbiology, genetics, mathematics, chemistry, and statistics, available at Syracuse University, provide additional courses for graduate programs.

Students interested in programs of study directed toward broad biological applications or resource ecology (i.e., environmental biology, tree pest control, conservation ecology, etc.) may elect to take a Master of Forestry degree to achieve these aims.

Current areas of active research by departmental faculty are: *anatomy and morphogenesis*, factors that influence the development and form of root systems,

that determine the dimensions of woody plant cells and that control the development of root and shoot apices; *physiology*, chemical regulation of organ growth, cell differentiation in tissue culture, the nature and physiology of mycorrhizae, ion transport, mineral nutrition and biochemical aspects of cambial physiology; photosynthesis; *ecology*, dynamics of plant communities in the Adirondack Mountain Region and on the Alleghany Plateau, the influence of man on plant communities, the interaction of environmental factors during vegetational change: *forest pathology*, diseases of forest plantations, heart-rots and cankers, tree rusts and physiogenic diseases; *wood deterioration*, the effects of stains and decays on wood use and their controls, the chemistry of wood decay, toxicity mechanisms, and the bioassay of toxicants; *mycology*, the taxonomy, physiology, sexuality and cultural characteristics principally of wood-inhabiting fungi; *genetics*, quantitative and population genetics, the heritability and natural variations in wood characteristics that are important in forest products and wood pulp; *taxonomy*, the identification, nomenclature and classification of bryophytes and vascular plants.

Illick Hall, the new biological sciences building, provides faculty and students with modern facilities for botanical research. Special facilities include rooftop greenhouses; growth chambers; herbaria and special research laboratories for tissue culture, microchemistry, microtechnique, microscopy, radiochemistry, chromatography, and computation. In addition a cobalt-60 source and a computer center are available at the College for student use. Extensive College forests, including most forest types of the Northeast, plantations and nurseries offer exceptional opportunities for field study of forest plants and diseases.

Research in the department is supported by private industry, the United States Forest Service, the Conservation Department, the Research Foundation of the State of New York, a variety of Federal agencies and by the State. In addition to direct project support, the grantees also provide for graduate research assistantships.

## FOREST ENTOMOLOGY

SIMEONE, *Chairman* (Ecology and Wood-Inhabiting Insects); ALLEN (Ecology and Population Dynamics); BREZNER (Physiology); KRALL (Ecology, Taxonomy, Histology); KURCZEWSKI (Morphology, Taxonomy, Behavior); NAKATSUGAWA (Toxicology):

Broad opportunities for study in forest entomology are available for the graduate student who, with the advice of his major professor, is permitted to follow a program of research supplemented by appropriate course work at this College and at Syracuse University. On-going research includes not only classical studies on the biology of forest insects and those causing the deterioration of wood, but a wide variety of possibilities such as histology and cytology, host-parasite relationships, insect dehydrogenases, biochemical systematics, comparative behavior, taxonomy, host selectivity, and mechanisms and enzymology of insecticide detoxification. Selected problems may also concern chemical, biological, and silvicultural aspects of insect control.

Students and faculty have a wide range of field and laboratory facilities available for research. The several forest properties represent varied forest environments while Illick Hall provides modern controlled facilities and instrumentation. More than 18,000 square feet of indoor space is available, with access to electron microscopy laboratory, environmental chambers, ultra centrifuges, nuclear magnetic resonance equipment, gas chromatograph, isotope laboratory, cobalt source for irradiation, a sound-proof room, glasshouse, and an insectary complex affording subjection of insects to controlled as well as ambient weather conditions. The taxonomic museum houses nearly 100,000 insect species deposited by entomologists for more than half a century. A computer center provides services in all phases of entomological research.

Cooperative problems involving other departments at this College and Syracuse University may be arranged. Areas of specialization are enhanced by supporting courses in other disciplines. Students interested in ecology, physiology or taxonomy, for example, may pursue these subjects relative to plants and other animals by selecting courses in forest botany, silviculture, forest zoology and biochemistry. Similar informal interdisciplinary pursuits are possible in chemical ecology, genetics, forest pathology, immunology and climatology.

## FOREST ZOOLOGY

ALEXANDER, *Chairman* (Vertebrate Ecology); BEHREND (Forest Wildlife Biology and Management); CHAMBERS (Population Ecology and Animal Physiology); DINDAL (Invertebrate Ecology); GRAVES (Vertebrate Physiology); HARTENSTEIN (Invertebrate Physiology); PRICE (Animal Behavior); WEBB (Vertebrate Ecology and Forest Wildlife Management).

Graduate studies in forest zoology include both basic and applied research on animals of the forest ecosystem, including its associated soils, water and related wildland areas. Programs are offered in vertebrate ecology, soil invertebrate ecology, endocrinology and physiology, population ecology, animal behavior, forest wildlife biology, aquatic ecology, and forest wildlife management.

The Department and its laboratory facilities are located in a new biological sciences building. They include specialized laboratories for research in physiology, soil invertebrate ecology, animal behavior, aquatic biology and radiotelemetry. An extensive collection of invertebrates is available, as well as the large Roosevelt Wildlife Collection. Various temperature-humidity chambers are available, including an environmental simulating chamber which programs and records light, temperature, humidity, altitude, wind, and precipitation.

The Department has an intensive research program in wildlife biology, open to graduate students on the College's Huntington Wildlife Forest, a 15,000-acre forest in the Central Adirondack Mountain region. Field research also can be conducted on the College's Heiberg Memorial Forest and Experiment Station. Several other areas are located within a 35-mile radius of Syracuse, and frequently are used for research purposes. These include Onondaga County's Highland Forest and Carpenter Creek Fish Hatchery; the State Conservation Department's game management areas—Tioughnioga, Three Rivers, Howland Island, and Cicero; the Montezuma National Wildlife Refuge; and privately-owned lands.

These facilities and areas are supplemented by the services and facilities of the College's other departments, particularly the Departments of Forest Botany and Pathology and Forest Entomology. The Departments of Forest Management and Silviculture provide support in relating the managerial and silvicultural facets of forest resources to wildlife biology study programs. The College is adjacent to Syracuse University with its large Department of Zoology, strong in physiology and developmental zoology. Available through this institution are programs in social sciences and engineering, including landuse and environmental pollution.

The Upstate Medical Center of State University of New York also is nearby. Its facilities are available for graduate students whose research can be benefitted by their specialized library, equipment and faculty.

Examples of recent research include the ecology of forest wildlife species, movements of larval fish, domestication of Norway rats and pheasants, marsh ecology, hematology of woodchucks, wetland planning, development of telemetric equipment, deer behavior, physiology of isopods, pesticides and soil fauna, physiology of hibernation, and the population dynamics of wild animals.

## FOREST CHEMISTRY (POLYMERS, NATURAL PRODUCTS, BIOCHEMISTRY)

SCHUERCH, *Chairman* (Wood and Polymer Chemistry); JAGUR (Physical and Polymer Chemistry); JAHN (Forest and Wood Chemistry); LA LONDE (Organic and Natural Products Chemistry); SILVERSTEIN (Ecological Chemistry); SMID (Physical and Polymer Chemistry); SONDHEIMER (Biochemistry); SZWARC (Physical and Polymer Chemistry); TIMELL (Carbohydrate and Wood Chemistry); WALTON (Biochemistry).

Recent years have seen profound advances in the fundamental knowledge of chemical areas which have special significance to forestry. Therefore, this department is very active in the following research areas: polymer chemistry, wood chemistry, biochemistry, chemistry of natural products including ecological chemistry, and organic material sciences.

Requirements for an M.S. or Ph.D. degree in chemistry include a research project and thesis, along with an appropriate program of courses at the College and at Syracuse University. Generous financial support is available in the form of fellowships, teaching assistantships, and tuition waivers to qualified foreign students and to postdoctorates.

Specific projects may vary from year to year, since they reflect the current interests of the department members. Current research projects with physiochemical emphasis are: the chemistry, solid state, and solution properties of natural and synthetic polymers; chemistry of free radicals, radical ions and charge-transfer processes; crystal structure and morphology of cell wall constituents. Current organic chemistry programs deal with synthesis of special polymers such as graft, block, stereoregular vinyl polymers, and polysaccharides, various aspects of alkaloid chemistry, isolation and characterization of insect and mammalian attractants, and the chemistry of compounds having strained bonds. An active program on the structure and degradation of the polymeric wood components, hemicelluloses, lignins and celluloses, is underway. In biochemistry, department members are studying: mechanisms of action of plant growth hormones, biochemical regulation of seed germination, plant enzymology, chemistry and biochemistry of plant phenols, and structure and metabolism of terpenoids in higher plants and microorganisms.

Graduate research laboratories in the Hugh P. Baker Laboratory are well equipped for polymer studies, chemical and biochemical research. Instrumentation includes analytical and preparative ultracentrifuges, Warburg respirometer, recording infrared and ultraviolet spectrophotometers, mass spectrometer, differential refractometer, electron spin resonance spectrometer, nuclear magnetic resonance spectrometer with spin decoupler, recording polarimeter and optical rotatory dispersion spectrometer, electron microscope, X-ray diffraction, chromatography and cold laboratories, and radiochemical laboratories with counters for solids, liquids and gases.

## PAPER SCIENCE AND ENGINEERING

O'NEIL, *Chairman* (Pulping, Bleaching and Paper Properties); GORBATSEVICH (Pulping, Bleaching, Paper Technology, and Paper Properties); STENUF (Chemical Engineering, Instrumentation, Thermodynamics, Process Control, Metallurgy and Corrosion); STRAUSS (Paper Properties, Paper Coating, Pulping, and Bleaching).

The pulp and paper industry is one of the most rapid in rate of growth among all major American industries and is fifth largest in the nation. The need for professional men with advanced education in science, engineering and technology is increasing at a rate more rapid than the growth of the industry. The College pioneered in providing graduate study in this area in 1920 with the organization of the Department of Paper Science and Engineering.

Since its inception, the Department has maintained a singularly high position in professional education in providing personnel for the continuing development of the pulp, paper, and allied industries. Its graduates, who are in constant demand, are located throughout the world.

The graduate program reflects the strong trend toward diversification in the industry and offers opportunities for obtaining Master of Science and Doctor of Philosophy degrees in a variety of subjects related to the manufacture of pulp and paper. Advanced courses are offered in such diverse areas as engineering, physical and organic chemistry, polymer chemistry, paper physics, and fiber morphology.

Major research areas in the Department are: physics and chemistry of pulping and bleaching; physical properties of fibers; characteristics of the paper web; chemical engineering operations as related to the pulping and papermaking processes; utilization of new raw materials; flow properties of papermaking materials.

The new Walters Hall, opened in 1969, is devoted exclusively to education and research in this field. It contains a large number of research and special purpose laboratories which house sophisticated equipment. This new facility will enhance the existing graduate program.

The research program is designed to generate new information regarding the fundamentals, the science, the engineering and the technology of the papermaking process as a contribution towards progress and the future development of the industry. These efforts are made possible by the use of advanced techniques such as electron microscopy, specialized spectrophotometry, nuclear magnetic and electron spin resonance and nuclear tracer techniques, all within the framework of one of the outstanding research facilities in the field. Also included is a modern chemical engineering laboratory designed for studies in all phases of unit operations, processes, process control and thermodynamics.

The Department maintains an experimental pulp and paper mill equipped with machinery and instrumentation for studies in many facets relating to this industry. These studies include pulping, pulp purification, refining, investigations of paper additives, and papermaking. This facility includes a paper machine, a 400 horsepower double disk refiner, a two-pocket grinder for mechanical pulping and auxiliary equipment.

Recent research has been directed to fundamental studies of pulping, bleaching, additives, the papermaking process, reactions of wood components during mechanical and chemical treatments, evaporation, fluid dynamics, heat transfer, the structure of wood and wood fibers.

## WOOD PRODUCTS ENGINEERING

Anderson, *Chairman* (Wood Quality-Growth Relations); Côté (Cellular Ultrastructure); Davidson (Physical Properties of Wood and Organic Composites); De Zeeuw (Wood Structure-Property Relations, Wood Anatomy); Meyer (Wood-Polymer Systems, Radio Isotope Techniques); Moore (Bonded Materials Technology); Pentoney (Mechanical Behavior, and Fracture Mechanics); Siau (Wood-Polymer Systems, Wood Fluid Relations); Skaar (Wood Physics); G. Smith (Materials Marketing); Whitt (Industrial Engineering).

Graduate study is in wood science, wood technology, production engineering in the wood products industries, and wood products distribution. The principal objectives are to develop originality and the analytical approach to problem solving. The student may emphasize appropriate phases, including the mechancial and physical properties of wood, structure and anatomy of wood, quality of wood, processing of wood into various forms and products, industrial management of wood manufacturing plants, distribution of wood products or organic materials science.

Research problems are selected after faculty-student consultation. Typical problem areas include variations in wood structure caused by ecological factors; ultrastructure of cell walls; preservative treatments for insect, fire, and decay resistance; protective or esthetic coatings; machining variables; bonded materials technology; mechanical and physical properties of wood and structure-property interaction of polymeric materials; composite material properties and design; chemical enhancement of wood; problems of the distribution enterprise for lumber and manufactured products and production engineering in wood products manufacture.

Modern laboratories and instrumentation are available for advanced research. There is a close liaison with specialists in other disciplines concerned with wood research so that interdisciplinary approaches to problems are possible. Syracuse University course offerings, especially in the College of Engineering, are available to supplement those of the College in planning graduate study programs.

Undergraduate backgrounds required for the diversified programs in the Department depend upon the student's interests in his graduate study. He may have majored in the Natural Sciences, Forestry, Wood Science, Wood Technology, Engineering, or certain of the social sciences, such as Economics or Business Administration. Programs of graduate study in Wood Products Engineering may be built on any of these foundations.

Special study and research opportunities exist with the wood-using industries. Close cooperation is maintained with these industries by the College. The large volume and variety of wood products processed within New York State creates a favorable climate for graduate study in this field.

## LANDSCAPE ARCHITECTURE

Sears, *Director* (Landscape Architecture); Earle (Art); Reimann (Landscape Architecture).

Because the School of Landscape Architecture is unique in its location at a College of Forestry, and because its campus is immediately adjacent to Syracuse University with traditional academic and social integration, there is a wide diversity of creatively interesting and challenging avenues for graduate study. In-depth studies in landscape architecture can be interrelated with college strengths in natural sciences, resources management and recreation, and can also take advantage of programs at Syracuse University such as architecture, planning, urban studies, social and behavioral sciences.

Students with undergraduate degrees in landscape architecture may choose to further develop skills in the landscape design process and apply them to the study of more complex environmental problems or to areas of special interest. They may also choose to focus mainly on parametal areas of interest such as identified above, with a view toward expanding their background in environmental concerns. Those whose undergraduate work has been in other areas most often will focus on landscape architectural studies using adjacent disciplines in supportive roles.

Research at the School, both sponsored and independent, centers on man-environmental relationships, particularly those of a current, critical nature. Graduate programs also usually include some investigative research in one of these areas, culminating in the preparation of a thesis.

Outstanding professionals periodically visit the School to discuss their special interests and to serve as critics in the design programs. In addition, the School, through its faculty and alumni, maintains contact with a great many of the landscape architectural firms, planning agencies, park systems, and governmental organizations throughout the country.

The Syracuse area has the largest concentration of landscape architectural firms in the State, outside of New York City.

With a metropolitan population of nearly three quarters of a million, the city has many progressive, urban-oriented studies and projects in process. Also, its central location is most favorable for access to other urban areas. New York State, with its large population base, has a rich variety of recreation areas administered by diverse governmental agencies and private owners. These vary from vest pocket parks in urban areas to the 2 million-acre Adirondack Preserve, and thus offer an ideal opportunity for study and research at many levels. The collateral interests of many of the disciplines at the College in all of the forested areas of the State, some fifteen million acres, are especially beneficial in the study of multiple-use possibilities for these lands. Thus, the opportunity for interdisciplinary studies involving the interests of landscape architecture, resource management, recreation, wildlife management, and sociology is unique, especially as these can be correlated with and augmented by the multiple interests and disciplines at Syracuse University.

The combination of the College library and the several libraries on the University campus offer excellent in-depth reference material to support study programs. Facilities at the School are extensive and include drafting, reproduction, model making, recording and projection equipment. The College maintains a computer center which is used primarily for instruction and research and is available for individual use by graduate students.

The profession of landscape architecture is experiencing its most rapid expansion in history. Its scope is increasing geometrically as man's concern for his environment grows. The opportunity to use additional training to better understand and satisfy the changing relationships of man and his environment and to fill a desperate need for landscape architects in education, in private practice, and in public service promises a rewarding career.

## INTERDISCIPLINARY GRADUATE STUDY PROGRAMS

Interdisciplinary graduate study programs at the College are both of an informal and formal nature.

Informal programs are of long tradition and permit students to select thesis topics and develop programs from a broad spectrum of professional and science topics in forestry, forest products, the forest sciences, and landscape architecture involving the supporting resources of several departments. These informal interdisciplinary programs are achieved readily through flexible degree requirements and the assignment of thesis committee members representing the key supporting areas. Examples of such programs are *Forest Land Use and Regional Planning* in the departments of Forest Management and Forestry Economics and the School of Landscape Architecture; *Chemical Ecology* in the biological sciences and Forest Chemistry departments, *Forest Soils* in the departments of Silviculture, Forest Management, the biological sciences, and Forest Chemistry; *Forest Recreation* in the departments of Forest Management, Forestry Economics, and the School of Landscape Architecture; and *Organic Materials Science* in the Departments of Forest Chemistry, Paper Science and Engineering, and Wood Products Engineering, the State University Polymer Center, the Empire State Paper Research Institute, and the Cellulose Research Institute. In this latter subject area, a degree program has been developed and approved by the College. Formal approval at State University and the State Education Department is pending.

Other programs suggestive of the range of topics available to students in the informal interdisciplinary approach are subjects involving the biological sciences and biochemistry; paper science, engineering, and plastics; wood products engineering, wood science, and polymer chemistry; silviculture and the botanical sciences; tree improvement and genetics; and wildlife biology and resources management. Though considerable breadth and flexibility are achieved in the informal interdisciplinary graduate study programs, students are still required to meet in full the degree requirements of their major department.

Formal programs leading to Masters and Doctor of Philosophy degrees are available in the multidisciplinary areas of *World Forestry* and *Water Resources.* These two programs are designed to permit greater supporting subject breadth and topic focus than is available in the departmentally based informal interdisciplinary programs. These formal programs have specific degree requirements and are under the direction of an assigned Program Leader and an advisory faculty group.

In addition to the Departmental faculties given on pages 70 to 80, graduate faculty members are selected from the extra-departmental research organizations to participate in and direct interdisciplinary graduate student programs. These include the members, listed below, of the Empire State Paper Research Institute and the State University Water Resources Center:

DENCE (organic chemistry and lignin reactions); LEOPOLD (organic chemistry and mechanical properties of fibers and paper); LUNER (mechanical and surface properties of fibers, films, and paper); MARTON (paper properties, microscopy, and pulping); and HENNIGAN (water management, water planning administration and policy).

### *World Forestry*

Program Leader—CHARLES C. LARSON, Director of the Office of International Forestry.

Graduate study and related research in world forestry is a College-wide activity supported by faculty representing the major areas of professional faculty specialization and broad backgrounds of foreign forestry experience. The non-technical elements of the program are supported by a wide variety of course offerings in the Maxwell Graduate School of Citizenship and Public Affairs, the Department of Geography and other departments of Syracuse University. Opportunities for field training and research in tropical forestry and related fields are available to qualified participants in this program, under cooperative agreements maintained by the College with the University of the Andes, at Merida, Venezuela, and the Institute of Tropical Forestry of the U.S. Forest Service, at Rio Piedras, Puerto Rico.

Graduate study in this field is aimed at supplementing and enriching the student's technical forestry knowledge and providing the broad background deemed necessary for effective service in foreign forestry. This includes service as forestry advisor, teacher and research specialist with national and international agencies, private business and industrial firms, philanthropic foundations and voluntary service organizations whose activities include the development and/or use of forest resources in other lands.

At the Master's level, program emphasis is on the attainment of general competence in foreign language, cultural anthropology, world geography, history, and international affairs, plus a broad understanding of the world forestry situation. While the candidate is urged to devote major effort to formal course work, a thesis is required to provide a creative experience in critical study and original thinking. Sufficient flexibility is maintained to enable the student to focus his studies on some aspect of world forestry either global, regional or national in scope.

At the doctoral level, program concentration is on a specialized discipline area such as forest botany, forestry economics, forest management, silviculture, or wood products engineering. Orientation to the world forestry field in this case is achieved in part through the selection of formal course work, but largely through providing an opportunity for the student to conduct his thesis research in residence abroad. Major program emphasis is placed on a thesis representing a significant contribution in original study in a world forestry problem area.

### *Water Resources*

Program Leader—C. E. Farnsworth, Chairman of the Department of Silviculture.

The College is concerned broadly with biological and managerial relationships of forest resources, and the productive uses and benefits of forest product and services. The College has particular interests in the ecological and biological relationships having to do with the management and utilization of water resources; with problems of water quality, quantity, and availability as these are related to land use and development activities; and with the special problems of the forest industries which utilize water in manufacturing processes or produce by-products which affect water quality. The rehabilitation, protection and improvement of watersheds is an important corollary area of interest.

Graduate study programs in water resources may be arranged on an informal basis within several departments of the College. Such departmental programs are usually organized within the Departments of Forestry Economics, Forest Management and Engineering, Silviculture, Landscape Architecture, Forest Zoology, Forest Entomology, Forest Chemistry, or Paper Science and Engineering and these often may involve support from several Colleges of Syracuse University.

The formal Interdisciplinary Program in Water Resources was organized in 1968 to supplement departmental programs by providing a sound basis for graduate academic programs designed to emphasize the multidisciplinary aspects of water resources. This effort recognized that water relationships are important in almost every aspect of human concern and merit attention as integrative and central elements rather than accessories. The Water Resources Program makes available to graduate students pertinent resources of the College and of

Syracuse University, and where appropriate, those of other units of the State University. The State University Water Resources Center located at the College provides particularly strong support to this program.

The program is not structured in terms of required courses of content. Attention is given to the particular objectives of each student who enrolls in the program. Within the framework of the general graduate study requirements of the College, courses, problems and seminars are selected to attain the specific objectives and special interests sought by the student. The academic competence required is demanding. The programs arranged are broadly integrative rather than concentrated in a discipline. Critical review of the program proposed for each student is made by an assigned program committee to insure that institutional standards are maintained and program objectives are met.

A major professor is assigned by the Program Leader to accept primary responsibility for the program of each student. Two additional faculty members in areas of expected academic or research emphasis are also selected. These three faculty members constitute the academic program committee for the student. The student is required to submit a formal report to the program committee consisting of a detailed work plan describing and defending his academic and research objectives and a schedule of courses and other elements of his contemplated study. This report is reviewed by the program committee, and is made a part of his permanent file. It is reviewed and updated at the beginning of each semester. The program committee will also serve as the thesis committee.

## ASSISTANTSHIPS, FELLOWSHIPS, AND SCHOLARSHIPS

The College awards a substantial number of assistantships, fellowships, and scholarships to qualified graduate students each year. The number of students receiving these awards varies from year to year, but recently more than three-quarters of all graduate students have received such support. In some cases it is not possible to provide a stipend at the start of the graduate study period, but such support is often provided after the student has demonstrated his competence.

Students may indicate their interest in a type of financial assistance on the graduate application form. Students on fellowships or assistantships must devote full-time to graduate study and are expected to register for 12 semester hours of credit each semester.

### *College Assistantships*

Assistantships are awarded students of demonstrated scholarship whose education and experience enables them to assist in laboratory instruction and research. The amount of the assistantships is about $3,400 per year. Students on assistantships carry 12 hours of course work and research per semester. In addition, tuition is waived for holders of assistantships, and the student is required to pay $50 per semester in fees and assessments.

### *Special Fellowships and Assistantships*

Fellowships and assistantships sponsored by industries, associations, and foundations are available in several departments. While the amount of stipends vary, they range from $2500 to $5000 a year. Holders of these special fellowships and assistantships are required to confine the major part of their research activities to definitely specified fields. Tuition is either waived or provided by sponsors, and the student is required to pay $50 per semester in fees and assessments.

### *National Science Foundation Fellowships*

The National Science Foundation cooperates with the College in awarding Graduate Traineeships to a number of graduate students each year. Stipends range from $2400 to $2800 for a 12-month period, with an additional $500 provided for each dependent. Tuition and fees are paid by the College.

### *National Defense Education Fellowships*

Graduate fellowships are currently available under Title IV of the National Defense Education Act in most of the Departments. Stipends begin at $2000 for a 9-month period and $2400 for a 12-month period. An additional allowance of $500 is available for each dependent. Fellowship tenure is for 3 years with the stipend increasing $200 each year. These fellowships are limited to doctoral students. Tuition and fees are paid by the College. Support for these fellowships comes from the Office of Education of the United States Department of Health, Education, and Welfare.

### *Tuition Waiver Scholarships—Foreign Students*

Tuition waivers may be awarded to a limited number of foreign students judged to possess special academic capabilities and with demonstrated financial need, and who are prepared to contribute to furthering international understanding and good will. Tuition waivers also are made available on a reciprocal basis to selected foreign students in special cooperative programs maintained between certain foreign institutions and the College. The student does not receive any actual cash payment, but the tuition charge is waived. Such students are required to pay $50 per semester in fees and assessments. Requests for such tuition waivers may be made on the graduate application form.

## LOANS

Graduate students may be eligible for various types of educational loans. The New York Higher Education Assistance Corporation offers loans to residents which are interest free until after college, and then draw 7* per cent annual interest. Repayment terms are arranged after graduation.

A U.S. citizen who needs financial assistance may borrow up to $500 a semester under the Student Loan Program of the National Defense Education Act of 1958. No interest will accrue until one year after college, and part of the loan will be cancelled if the student becomes a public elementary or secondary school teacher or college teacher. A 10-year repayment period is allowed.

## OTHER FORMS OF SELF-SUPPORT

Graduate students without assistantships or fellowships may be employed at an hourly rate to assist in laboratories and other College activities. Such hourly employment does not include free tuition.

Employment also may be sought on a part-time basis through the Student Services office of the College or the Syracuse University Placement Office.

## REQUIREMENTS FOR DEGREES

The College confers the degrees of Master of Science, Master of Forestry, Master of Landscape Architecture, and Doctor of Philosophy upon students who qualify by completing specified requirements of study, research, and residence.

Graduate programs are flexible and developed individually. Each program is planned by the major professor with the student to meet his particular academic needs. Sometimes this includes undergradute courses for which no graduate credit can be given. In every case emphasis is placed on outlining a study program leading to a high level of scholarly achievement.

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*Effective on loans made after 4/1/69.

An entire program for each student is usually planned during the first two weeks of the academic year. It must be approved by the major professor, department chairman, and Director of Graduate Studies. The program is modified as required upon recommendation of the major professor and with approval of the Director of Graduate Studies. A thesis committee consisting of the major professor and several other faculty members is appointed early in each student's study program.

All programs leading to the Master of Science, Master of Forestry, and Master of Landscape Architecture degrees require at least 30 semester hours of graduate credit. Normally, graduate-level course work (passed with an average grade of at least B) takes up 12 to 24 hours. The remaining credit-hour requirement is met by submitting a thesis presenting the results of original research. Acceptance of the thesis depends on clear demonstration of ability to search and evaluate pertinent literature independently, to plan and carry through independent and important investigation, to interpret the significance of findings, and to present the subject in a well-organized, lucid, and scholarly thesis. The student must pass a final oral examination in which he defends his thesis and demonstrates his knowledge of related subject areas.

Candidates for Master's degrees must spend at least two semesters in residence at the College of Forestry.

The Doctor of Philosophy degree is conferred on students who have completed a minimum of 90 semester hours of graduate level credit with an average grade of at least B. A student holding a Master's degree may be allowed up to 30 hours of credit toward the 90 required for the doctorate. The doctoral thesis is evaluated at between 30 and 45 hours of graduate credit. The student must pass a comprehensive examination covering his field in depth and, in a somewhat broader manner, allied fields, before being admitted to candidacy for the doctorate. He must also pass a final oral examination in defense of his thesis and also covering his major and minor fields of study.

In addition, the student must demonstrate a reading knowledge of one foreign language in which pertinent literature in his subject area appears. Some departments require a second foreign language or demonstrated knowledge of statistics or computer analysis where these are important in the field of study. The Director of Graduate Studies or the departmental chairman will provide information on such additional special requirements. Courses taken to acquire a reading knowledge of a language do not receive graduate credit.

A candidate for the Ph.D. degree with only a Bachelor degree must be in residence for at least two full academic years. A candidate having a Master's degree must be in residence for at least one full academic year.

The requirements outlined govern the minimal amount of work to be done. Quality of work is especially emphasized for the Doctor of Philosophy degree. The student is required to penetrate the frontier of knowledge in his particular field and make a definite contribution to this knowledge. He is required to demonstrate original scholarship of a high order in his search and evaluation of literature, in the planning, execution, and interpretation of his own research, and in the presentation of his findings in a thesis. Subsequent publication in a scholarly journal is expected.

## ADMISSION REQUIREMENTS

Admittance to graduate study will be granted only to applicants with at least a Bachelor's degree from a recognized institution, whose preparation has been suitable in quality and content for the proposed field of major study. Applicants will be evaluated on the basis of the following: (1) their academic record should show approximately a "B" or 80% average for the Junior and Senior years; (2) Graduate Record Examination Aptitude scores and in some cases, subject matter tests indicative of graduate study ability; (3) supporting letters of recommendation, and (4) where appropriate other evidences of scholarly achievement and potential. Priority in admission is given applicants who have high scholastic standing.

All applicants are required to submit Graduate Record Examination aptitude scores and subject matter (advanced) test scores when applicable in their subject area with their graduate application. This examination is offered several times per year in major cities of the world. For information on registration and scheduling write to the Educational Testing Service, Princeton, New Jersey 08540. In submitting test scores request that they be sent to the Director of Graduate Studies, State University College of Forestry, Syracuse, New York (Institutional number R2530).

The College provides a special form for application for graduate work. Requests for information and applications should be addressed to the Director of Graduate Studies, State University College of Forestry, Syracuse, New York 13210.

Under special conditions and on recommendation of the department chairman concerned, students may be admitted at the discretion of the Graduate Committee and carried on a non-degree status. Non-degree students accepted for special study programs may be regarded as visitors and normal graduate standards need not apply.

## INTERNATIONAL STUDENTS

Traditionally the educational needs in forestry, forest products, and their supporting science disciplines have been recognized on a world-wide basis at the College of Forestry. Recently an Office of International Forestry was created to pay special attention to various world forestry problems. Citizens of other countries with special educational objectives are accepted for graduate study in all programs. They must show satisfactory evidence that they have completed studies in their major field equivalent to those at a recognized American institution with a scholastic record equivalent to a B average in their Junior and Senior years. They must submit Graduate Record Examination scores as explained in the section on Admission Requirements. Also, applicants whose native language is other than English must submit scores on the Test of English as a Foreign Language (TOEFL) as an indication of their ability with the English language. This examination is offered several times per year in major cities of the world. For information on registration and scheduling write to the Educational Testing Service, Princeton, New Jersey 08540, U.S.A. In submitting test scores request that they be sent to the Director of Graduate Studies, State University College of Forestry, Syracuse, New York. See the section on scholarships for information on tuition waivers in special cases for foreign students.

## ACADEMIC REQUIREMENTS

Graduate students are required to maintain a B average as a minimum. Students whose cumulative grade point average falls below "B" at the end of any semester are placed on probation for the following semester. A student placed on probational status must qualify for full standing by the end of that semester or be subject to dismissal from graduate study.

## TUITION FEES AND EXPENSES

### *Paid Every Semester**

*Total fees and assessment to students who have been granted a tuition waiver: $50.00 per semester.

| | |
|---|---|
| Tuition | $300.00 |
| Fees | 17.50 |

### *Paid Once*

Commencement fee (this fee includes the cost of binding the four required copies of the thesis. This fee must be paid before graduation) .......... $25.00

Qualified New York State residents are eligible for Scholar Incentive Program grants and State University Grants-in-Aid which vary with the net taxable family income of students and the level of study, and provide substantial reductions in tuition. For details, contact the Financial Aids Officer at the College of Forestry.

All graduate students are required to take out a Student's Accident and Sickness Insurance Policy or its equivalent. Fellowships funded through the State University Research Foundation are required to take the health and accident insurance available through the Foundation.

Living expenses are subject to considerable variation. Many graduate students live in private homes where prices range from $8–12 per week for a single room, and from $10–15 per week or more for double room. Students are eligible to purchase meal tickets from Syracuse University (currently $17.75 per week, $519.75 per year, 34 weeks). This ticket pays for all meals except Sunday night supper. Expenses for textbooks and supplies average $100 or more a year. Personal expenses vary depending on needs and tastes.

## HOUSING

The College of Forestry does not operate dormitories or student residences. These are facilities of Syracuse University. Married students are certified to the Syracuse University Married Students' Housing Office, through which the University operates rental dwelling units for families with and without children. Veterans of the Armed Forces of the United States and her allies are given priority. Married students who wish to live in University housing should write to the Director, Married Student Housing, 1528 East Colvin Street, Syracuse, New York 13210.

## VIII

## CONTINUING EDUCATION

The philosophy that education is a lifelong pursuit is an ancient one, and was written into the law creating the College of Forestry. This concept is doubly important to the sciences and professions in this technological age, when new knowledge is bursting in all directions. Hence, the College has, over the years, succeeded in communicating knowledge on forest resources management, utilization and conservation to a wide variety of off-campus publics. The entire College faculty has contributed to these programs.

Conferences, symposia, seminars and short courses on various aspects of forestry and the related sciences are conducted at both the basic and applied levels. Audiences include forest owners, managers, and operators; wood engineers and forest industries personnel; academic and scientific groups, conservation and recreation personnel from local, and state agencies, and other public and private planning groups and citizen-action committees. General and technical publications, a specialized film library, series of radio programs, a speakers bureau, and a limited number of special programs on commercial television are the primary mass media employed.

The College recognizes that the informational needs of New York's citizens are undergoing change. Some of the factors now affecting the continuing education program are: the abandonment of farmland and the increasing urban character of the population, the changing pattern of ownership of forestland, the rise in level of education and sophistication in a more affluent society, the dynamics of technological change, and the increase in leisure time, greater mobility in travel, and outdoor recreation.

In looking to the future, the College is aware of society's increasing interest and concern with natural resources, the quality of man's environment, the near crisis in water resources, and the need for greater outdoor recreation opportunities. This trend has been called "a growing resource ethic" — an awareness of the obvious and subtle relationships between man and his natural environment, and a desire to enhance them.

This movement of widespread interest and concern comes at a time of accelerating technological obsolescence for the practicing forestry professional, resource scientist and engineer, public and industrial leader, conservation and science teacher, and the general public. Continuing education programs play a vital role in helping to close the gap between new technology and the demands of society.

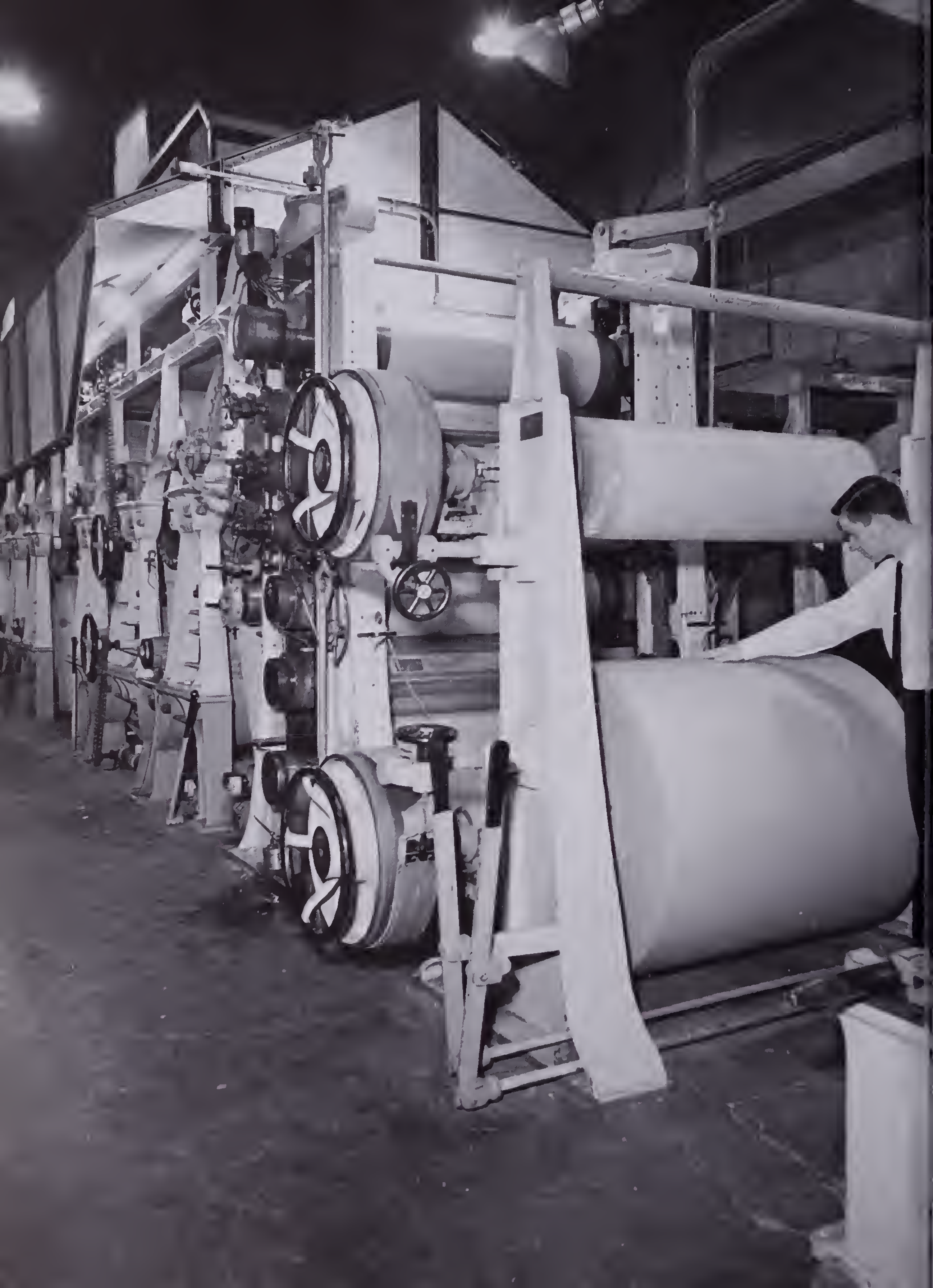
At the College of Forestry, primary attention is given to three basic objectives:

1. Updating personnel whose professional, scientific, technical and production management responsibilities are in areas served by the College. Here the aim is to provide more recent and better knowledge for improved performance of responsible tasks.

2. Deepening the knowledge of a specific, relatively narrow well-defined facet of professional, technological or managerial development, often that which results from new approaches or relationships, or new research or methods.

3. Broadening the awareness and appreciation of the general public concerning the forests and other natural resources of New York, the rational use of forestlands for timber production, recreation, wildlife, and watershed protection, and the jobs, services, and products derived from these basic resources.

For information on specific continuing education projects, inquiries should be sent to: Coordinator of Continuing Education, State University College of Forestry, Syracuse, N. Y. 13210.



# IX

# COURSE OFFERINGS

The academic resources of three institutions — the State University College of Forestry, Syracuse University, and the State University Upstate Medical Center — are available to undergraduates and graduate students in developing their study programs at the College.

In addition to the many professional and basic science courses offered by the College, a wide range of offerings are taken either as required courses or are available as electives at adjacent Syracuse University. The required courses are in certain subject areas of chemistry, engineering, physics, mathematics, geology, English, business law, personnel relations, and public address. The elective courses include most academic offerings of Syracuse University and representative subject areas are the humanities, social sciences, life sciences, physical sciences, engineering, mathematics, and the arts. Descriptions of Syracuse University courses are not included in the following College of Forestry courses.

In graduate programs at the College, Syracuse University courses are used extensively in the fields of mathematics, physics, chemistry, biology, engineering, economics, business, and citizenship. The State University Upstate Medical Center has courses available for graduate programs in the areas of anatomy, biochemistry, cytology, microbiology, and physiology.

## DESCRIPTION OF COLLEGE OF FORESTRY COURSES

The courses offered by the College are grouped by general subject areas, and the number of credit hours appears after the course title. A credit hour means one recitation (or lecture) hour per week. Three laboratory hours are equivalent to one lecture hour.

### COURSE NUMBERING SYSTEM (Effective September, 1968)

I. Code Levels:

| | |
|---|---|
| 000–099 | Non-credit courses |
| 100–199 | Freshman courses |
| 200–299 | Sophomore courses |
| 300–499 | Junior & Senior courses |
| 500–599 | Junior & Senior courses which may be accepted for graduate credit at the discretion of the graduate student's major advisor, usually with the requirement of additional work to be performed. |
| 600–699 | Graduate courses designed primarily for beginning graduate students but available for credit to all graduates. |
| 700–899 | Advanced graduate courses designed primarily for second and third year graduates and beyond, but available to all graduates. |
| 900–999 | Special graduate courses available only to doctoral students. |

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## APPLIED MATHEMATICS

### 565. INTRODUCTION TO COMPUTER PROGRAMMING

*3 credit hours*

Principles of communication with electronic digital computer systems by means of the Fortran Language. The presentation of the course pre-supposes a background and maturity in the logic of the scientific method. Actual practice is achieved by programming and running problems on the College Computer Center equipment. Fall & Spring. Mr. C. N. Lee & Staff.

*Prerequisite*: Junior or higher standing.

### 571. INTRODUCTION TO STATISTICAL ANALYSIS

*3 credit hours*

Two hours lecture and three hours lab. Elementary probability, sampling distributions, statistical estimation, hypothesis testing, inferences regarding means and variances, simple regression and correlation, and determination of sample size. Fall & Spring. Mr. Kasile.

*Prerequisite*: Junior or Senior standing.

### 591. INTRODUCTION TO PROBABILITY AND STATISTICS

*3 credit hours*

Two hours lecture, three hours lab. Bases for application of standards of accuracy and statistical methods in forest science and technology; elementary probability in relation to the distribution of random errors and the measurement and control of these errors. Fall. Mr. Bickford.

*Prerequisites*: Two semesters of calculus.

### 593. INTRODUCTION TO ANALYSIS OF VARIANCE

*3 credit hours*

Two hours lecture, three hours lab. One and two-way analysis of variance, multiple comparisons, subsamples, unequal sample size, tests of hypotheses, statistical estimation, determination of sample size. Fall. Mr. Kasile.

*Prerequisites*: A M 571 or A M 591, or equivalent.

### 595. INTRODUCTION TO SAMPLING TECHNIQUES

*3 credit hours*

Two hours lecture, three hours lab. Introduction to the scientific basis of sampling: selecting an appropriate sampling unit; choosing an efficient design; calculating sampling error; determining a sample size to meet stated objectives. Spring. Mr. Bickford & Staff.

*Prerequisites*: A M 571 or equivalent.

### 710. COMPUTER CONCEPTS

*3 credit hours*

Fundamental concepts of computer design and applications. Emphasis is placed on general principles to provide a basis for creative computer applications. Spring. Mr. C. N. Lee & Staff.

*Prerequisites*: A M 565 or equivalent; permission of instructor.

### 719. STATISTICAL ANALYSIS

*3 credit hours*

Two hours lecture, three hours lab. A treatment of statistical inference, including paired design, group design, linear regression and correlation, one-way analysis of variance, and some applications of chi-square. Calculation of statistics, tests of hypotheses, and proper interpretation of calculated statistics. Fall. Mr. Bickford.

### 720. ANALYSIS OF VARIANCE

*4 credit hours*

Three hours of lecture and recitation, three hours of lab. Multiway classifications in the analysis of variance, with emphasis on the development of models, including randomized blocks, latin squares, split plots, and factorial designs with fixed effects, random effects, and mixed effects; multiple and partial regression and correlation (including curvilinear), using matrix methods; analysis of co-variance, higher order contingency tables, distribution free methods, and sequential testing. Spring. Mr. Kasile.

*Prerequisite*: Graduate standing and in an introductory course in statistics covering material through the one-way analysis of variance.

## BIOLOGY (FOREST BIOLOGY)*

### 301. FIELD BIOLOGY (SUMMER SESSION IN FIELD FORESTRY)

*1 credit hour*

One week of field work. Major plant and animal species of the forest community and their dynamic interrelationships with the environment. Mr. Alexander & Divisional Faculty.

### 320. GENERAL ECOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments, ecological factors, energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography and representative ecosystems. Fall. Mr. Alexander.

*Prerequisite*: A year course in biology or equivalent.

### 330. PRINCIPLES OF GENERAL PHYSIOLOGY

*3 credit hours*

Three hours of lectures. Introduction to the dynamics of living systems with emphasis on the universality of the biological world. Fall. Mr. Brezner.

*Prerequisite*: One semester of organic chemistry.

### 498. RESEARCH PROBLEM IN BIOLOGY

*1–3 credit hours*

Independent research in topics in Forest Biology for the superior undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions, and critiques scheduled as necessary. Final written report required for departmental record. Fall & Spring. Staff.

*Prerequisite*: Consent of instructor.

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*See also listings for Forest Botany, Forest Entomology and Forest Zoology.

### 515. ADVANCED LIMNOLOGY

*4 credit hours*

Note: SUNY, Albany No. BIO 516

Eight weeks, two full days/week. Comprehensive analysis of primary and secondary producers in a selected series of Adirondack lakes and streams. Lecture-discussion sessions to serve to direct individual student projects detailing the flow of energy and circulation of matter in a variety of mountain habitats. Summer Session I & II, Cranberry Lake Biological Station. Mr. McNaught, SUNYA.

*Prerequisite*: Bio 202, 12 hours of biology.

### 521. ECOLOGY OF FRESHWATERS

*2 credit hours*

Note: SUNY, Albany No. BIO 421

Two full days/week for four weeks. Experimental and observational studies of environmental and biotic interactions, influencing productivity of freshwaters. Basic concepts at the organismic, population, and community level. Summer Session I, Cranberry Lake Biological Station. Mr. Stross, SUNYA.

*Prerequisite*: A course in ecology.

### 570 FUNDAMENTALS OF GENETICS

*4 credit hours*

Three hours of lecture, three hours of lab. A general course in genetics. Breeding experiments with animals and plants are used to demonstrate the principles of heredity. The application and role of genetics in research is stressed. Fall. Mr. Valentine.

*Prerequisites*: F Bot 100, F Zool 100 or equivalent courses.

### 722. BIOCLIMATOLOGY

*2 credit hours*

Note: SUNY, Albany No. ATM 513

Two full days/week, for four weeks. Principles of climatology and meteorology as they relate to studies of the biosphere. Emphasis is upon ecologic problems and microclimatic techniques related to forestry, agriculture, and industry. Summer Session II, Cranberry Lake Biological Station. Mr. Scott, SUNYA.

*Prerequisite*: Consent of instructor.

### 785. HISTOCHEMICAL TECHNIQUES

*3 credit hours*

One lecture and two labs. The techniques of the microtomecryostat, freeze-drying, and freeze substitution, histochemical stains, and autoradiography in the elucidation of the constitution of cells and tissues. Spring (even calendar years). Messrs. Tepper & Krall.

*Prerequisites*: Microtechnique and organic chemistry.

### 835. MEMBRANES AND BIOLOGICAL TRANSPORT

*3 credit hours*

Two hours of lecture and one hour of discussion. Composition, structure and physical properties of membranes. Membrane functions including transport, bioelectricity and cell compartmentalization. Specific transport processes in biological systems and problems of supply and demand. Fall (alternate years). Mr. Schaedle.

*Prerequisites*: One semester of biochemistry and an advanced physiology course, or permission of the instructor.

### 997. BIOLOGY SEMINAR

*1–3 credit hours*

One to three hours of lecture-discussions per week. The course emphasizes current concepts and developments in biology. Fall and/or Spring. Mr. Zabel & Staff.

## BOTANY (FOREST BOTANY AND PATHOLOGY)*

### 100. FOREST BOTANY

*4 credit hours*

Prerequisite to all other courses in Forest Botany. Three hours of lecture, three hours of lab. Introductory study of the morphology, anatomy, physiology and reproduction of seed plants. Fall. Mr. Morrison, Mrs. Wang & Staff.

### 210. DENDROLOGY I

*2 credit hours*

One hour lecture and one three-hour lab/field trip each week. Field study, identification, taxonomy, and elementary silvics of important forest trees of North America. Fall. Mr. Ketchledge & Staff.

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*See also listings for Forest Biology.

### 211. DENDROLOGY II

*1 credit hour*

One three-hour lab/field trip each week. A continuation of the first semester course with special emphasis on species native to Northeastern North America or of major economic or world-wide importance. Spring. Mr. Ketchledge.

### 260. SHADE TREE PATHOLOGY

*3 credit hours*

Two hours of lecture and three hours of lab per week. The common diseases of woody plants are stressed. Emphasis is placed on disease recognition and control and on the reaction of woody plants to their environments. Spring. Mr. Silverborg.

*Prerequisite*: F Bot 210.

### 310. CLASSIFICATION OF THE PLANT KINGDOM

*3 credit hours*

Two hours of lecture and three hours of lab. Introductory study of the Plant Kingdom with emphasis on the angiosperms. Spring. Mr. Morrison, Mrs. Wang & Staff.

### 330. PLANT PHYSIOLOGY

*2 credit hours*

Two hours of lectures. Descriptive aspects of the fundamental activities of plants. Subjects to be covered include cell structure, water and mineral metabolism, organic nutrition and a brief introduction to biological control mechanisms. Not open to biology majors. Fall. Mr. Schaedle.

*Prerequisite:* F Bot 100 or equivalent.

### 510. MYCOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Comprehensive survey of the morphology, taxonomy, and activities of fungi. Laboratory experience in isolation and identification of fungi and experimental work with fungi in pure culture. Fall. Mr. Griffin.

*Prerequisite:* F Bot 310.

### 515. SYSTEMATIC BOTANY

*2 or 3 credit hours*

Two hours of lecture, three hours of lab. Identification, nomenclature and classification of flowering plants with special emphasis on local flora and on developing the ability to classify the plants of any region. Spring. Mr. Morrison.

*Prerequisite*: F Bot 310 or permission of the instructor.

### 517. ADIRONDACK FLORA

*2 credit hours*

Note: SUNY, Albany No. BIO 517

One full day/week for eight weeks. Field study of the summer flora of the Adirondack Mountains. Summer Session I & II, Cranberry Lake Biological Station. Mr. Hillebrand, SUNYA, and Mr. Ketchledge, College of Forestry.

*Prerequisite*: An elementary course in Systematic Botany.

### 522. ECOLOGY OF FOREST COMMUNITIES

*2 credit hours*

Note: SUNY, Albany No. BIO 422

Two full days/week for four weeks. Study of the structural and functional characteristics of selected Adirondack forest ecosystems; techniques of vegetational and environmental analysis. Summer Session II, Cranberry Lake Biological Station. Mr. Ketchledge, College of Forestry.

*Prerequisite*: At least one semester of General Ecology plus 15 hours of other biological sciences, and senior standing.

*Special requirements*: Students must be prepared to go on one over-night camping trip to an isolated study area.

### 525. FOREST ECOLOGY

*3 credit hours*

Two hours of lecture/discussion; one lab/field trip; one weekend field trip. An advanced course stressing current research in forest dynamics, vegetational development, ecological methods, and phytosociology. Spring. Mr. Ketchledge.

*Prerequisites:* F Bot 210 and 211; F Bio 320 or Silvi 521.

### 527. BRYOECOLOGY

*2 credit hours*

Field and lab work at the Biology Station. Study of the bryoflora of the major ecosystems of the Adirondack Mountain region. Summer Session I, Cranberry Lake Biology Station. Mr. Ketchledge.

*Prerequisites*: Survey of the Plant Kingdom; Systematic Botany; General Ecology.

*Special requirement*: Students must be prepared to go on two overnight trips to isolated forest areas.

### 530. PLANT PHYSIOLOGY

*2 credit hours*

Two hours of lecture. Internal processes and conditions in higher plants with emphasis on physiological and biochemical concepts. For students majoring in the biological sciences. Spring. Mr. Wilcox.

*Prerequisite*: F Bio 330

### 531. PLANT PHYSIOLOGY LABORATORY

*2 credit hours*

Two lab sessions. Introduction to current methods and procedures of physiological research including nutrition, tissue culture, photosynthesis, respiration, and hormonal regulation of growth. Spring. Messrs. Wilcox and Schaedle.

*Prerequisites*: F Biology 330, corequisite F Botany 530, or permission of the instructor. Advance tentative registration with the instructor is required.

### 560. FOREST PATHOLOGY

*3 credit hours*

Two hours of lecture and three hours of lab. Major diseases of forest trees and deterioration of forest products with emphasis on disease identification, principles of disease development, effects of disease on the host, and practical control measures. Fall. Mr. Manion.

### 562. WOOD DETERIORATION BY MICROORGANISMS

*3 credit hours*

Two hours of lecture, three hours of lab/field trip. Major types of fungus defects of wood and its products and principles of control. Special emphasis on physiology of microorganisms, chemistry of wood decay, wood durability, toxicants, lumber discolorations, heartrot, decay in forest products, slime problems in pulp and paper mills, and water pollution. Fall. Mr. Silverborg.

*Prerequisite*: Organic Chemistry. Course offered in even calendar years.

### 585. PLANT ANATOMY

*3 credit hours*

Two hours of lecture, three hours of lab. An introductory course in plant anatomy designed to familiarize the student with the organization and development of the primary and secondary plant body of higher plants. Spring. Mr. Tepper.

*Prerequisite*: F Bot 100.

### 630. FUNGUS PHYSIOLOGY

*3 credit hours*

Two hours of lecture, one hour of discussion. Principles of growth, reproduction and differentiation of the fungi emphasizing the role of the environment in controlling fungal processes. Spring (even years beginning in 1970). Mr. Griffin.

*Prerequisites*: Two semesters of physiology or biochemistry.

### 715. ADVANCED SYSTEMATIC BOTANY

*2 or 3 credit hours*

Lectures and lab. Field trips. Advanced study in the identification, nomenclature, and classification of flowering plants. Special emphasis on Gymnospermae, Compositae, and Gramineae. Fall. Mr. Morrison.

*Prerequisite*: F Bot 515 or equivalent.

### 731. ENERGY CONVERSION PROCESSES

*4 credit hours*

One hour of directed reading; 3 credit hours of laboratory work. Experimental study of photosynthesis, respiration and mechanochemistry. Fall semester odd years. Messrs. McDowell and Schaedle.

*Prerequisites*: F Bot 530 and 531 or an equivalent physiology course. One semester of biochemistry with laboratory or consent of the instructor.

### 732. DEVELOPMENTAL PROCESSES AND THEIR REGULATION

*4 credit hours*

One hour of directed reading, 3 credit hours of laboratory work. Experimental study of developmental processes, their regulation by internal and external factors. Fall semester even years. Messrs. Wilcox & Griffin.

*Prerequisites*: F Bot 530 and 531 or an equivalent physiology course. One semester of biochemistry with laboratory or consent of the instructor.

### 760. PHYTOPATHOLOGY

*3 credit hours*

Two hours of lecture and three hours of laboratory. Major diseases of ornamental plants, vegetable crops, fruit crops, field crops, and trees. Spring (odd-numbered years). Mr. Manion.

*Prerequisite*: F Bot 510, or permission of the instructor.

### 797. FOREST BOTANY SEMINAR

*1 credit hour*

Assigned reports and round-table discussion of current topics in plant science. Fall & Spring. Staff.

### 798. RESEARCH IN FOREST BOTANY

*Credit hours arranged according to nature of problem.*

Advanced study and research problems in forest pathology, wood deterioration, tree physiology, anatomy, mycology, ecology, taxonomy, and genetics. Typewritten report required. Fall & Spring. Staff.

### 810. ADVANCED MYCOLOGY, HOMOBASIDIOMYCETES

*3 credit hours*

Review of selected literature as well as laboratory training in identification and research techniques. Fall. Mr. Lowe & Staff.

*Prerequisite*: F Bot 510. Course offered in odd calendar years.

### 811. ADVANCED MYCOLOGY, HETEROBASIDIOMYCETES

*3 credit hours*

Review of selected literature as well as laboratory training in identification and research techniques. Spring. Mr. Lowe & Staff.

*Prerequisite*: F Bot 510. Course offered in even calendar years.

### 812. ADVANCED MYCOLOGY, ASCOMYCETES

*3 credit hours*

Review of selected literature as well as laboratory training in identification and research techniques. Fall. Mr. Lowe & Staff.

*Prerequisite*: F Bot 510. Course offered in even calendar years.

### 813. ADVANCED MYCOLOGY, MYXOMYCETES, PHYCOMYCETES, FUNGI IMPERFECTI

*3 credit hours*

Review of selected literature as well as laboratory training in identification and research techniques. Spring. Mr. Lowe & Staff.

*Prerequisite*: F Bot 510. Course offered in odd calendar years.

### 830. PHYSIOLOGY OF GROWTH AND DEVELOPMENT

*2 credit hours*

Lecture. A study of the growth and development of plants and the physiological and biochemical processes that influence the development of form and structure in higher plants. Fall (even years). Mr. Wilcox.

*Prerequisites*: F Bot 530, 585, and organic chemistry or permission of instructor.

### 860. ADVANCED FOREST PATHOLOGY

*2 credit hours*

Lecture, discussion, and field trips. Hours to be arranged. Advanced studies in forest pathology and wood deterioration with emphasis on current topics in the literature. Course offered in odd calendar years. Spring. Mr. Silverborg.

*Prerequisite*: F Bot 560 or 562.

### 870. POPULATION GENETICS

*3 credit hours*

The principles and theorems of population genetics based upon gene frequencies and genic effects in theoretical populations. Effects of inbreeding, selection, mutation, fitness, migration, and other factors are considered. Composition and changes in natural and laboratory populations are related to genetic theory. Spring (even numbered years). Mr. Valentine.

*Prerequisites*: F Biol 570, 1 semester of calculus; A M 720, or permission of instructor.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and disseration. Fall & Spring. Staff.

## CHEMISTRY (FOREST CHEMISTRY)

221. ORGANIC CHEMISTRY I

*3 credit hours*

Two hours of lecture, one hour of recitation. A study of representative classes of carbon compounds. The relation of chemical reactivity and physical properties to electronic and three dimensional characteristics of carbon compounds. Fall. Mr. LaLonde.

*Prerequisites*: Chem 106 & Chem 116.

222. ORGANIC CHEMISTRY LABORATORY I

*1 credit hour*

One three-hour lab period. Laboratory techniques in organic chemistry. Extraction, crystallization, melting points, distillation, column and thin layer chromatography. Simple syntheses and reaction techniques. Fall. Mr. Baum.

*Prerequisites*: Chem 106 & Chem 116.

223. ORGANIC CHEMISTRY II

*3 credit hours*

Two hours of lecture, one hour of recitation. A continuation of a study of representative classes of carbon compounds. Spring. Mr. LaLonde.

*Prerequisite*: F Chem 221 or equivalent.

224. ORGANIC CHEMISTRY LABORATORY II

*1 credit hour*

One three-hour lab period. Continuation of F C 222. Greater emphasis on synthesis and purification of organic compounds. Qualitative organic analysis: functional group analysis, usage of infra-red and NMR spectra. Spring. Mr. Baum.

*Prerequisite*: F Chem 222 or equivalent.

495. INTRODUCTION TO RESEARCH I

*1 credit hour*

Introduction to chemical literature. Problems in the use of Beilstein. Problems in structure proof by spectrophotometric and chemical methods. Development of work plan for research problem in the chemistry of wood, polymers, natural products, or in biochemistry. Typewriten report including statement of problem, literature survey and work plan. Fall. Mr. Schuerch & Staff.

497. UNDERGRADUATE SEMINAR

*1 credit hour*

Literature surveys and seminars on topics of current research interest and recent advances in Chemistry. Spring. Mr. Walton.

498. INTRODUCTION TO RESEARCH II

*6 credit hours*

Directed laboratory research with special laboratory techniques. Typewritten report on data, procedures, results and conclusions. Spring. Staff.

520. NUCLEAR CHEMICAL TECHNIQUES

*3 credit hours*

One hour lecture, one hour 16 mm movie, and five-hours of laboratory each week. Laboratory techniques and practices will be stressed. Experience with modern radioisotope counting techniques is offered with such instruments as Geiger-Muller, proportional, and scintillation counters, the use of the gamma spectrometer, the beta liquid scintillation spectrometer. The high energy gamma radiation from the Cobalt-60 source is also used for polymerization and biological experiments. Experience with the fast neutron generator in activation analysis is also available. Spring. Mr. Meyer.

*Prerequisites*: Physical, organic and inorganic chemistry, or permission of instructor; Chemistry 521 is strongly recommended. Advance tentative registration with instructor is required.

530. BIOCHEMISTRY I

*3 credit hours*

Three hours of lecture. General biochemistry with emphasis on cellular constituents and metabolic reactions. The chemical, physical and biological properties of amino acids, proteins, carbohydrates and their intermediary metabolism will be discussed. The chemistry of enzymes, energy transfers and biological oxidations will also be covered. Fall. Mr. Sondheimer.

*Prerequisites*: F Chem 221 & F Chem 223 or equivalent and Chem 346 & Chem 356 as pre- or co-requisites.

### 531. BIOCHEMISTRY LABORATORY

*2 credit hours*

One hour lecture and discussion, three hours laboratory. This course will stress techniques used in biochemical research. Techniques used include various types of chromatography, electrophoresis, and spectrophotometry, and methods involved in the isolation, purification and assay of enzymes. Fall. Mr. Walton.

*Prerequisite:* Chem 332 & Chem 333. *Co-requisite:* F Chem 530.

### 532. BIOCHEMISTRY II

*3 credit hours*

Three hours of lecture. Topics discussed are: application of tracer techniques to biochemistry, the chemical and biochemical properties of lipids, theories on the origin or life, photosynthesis and the biosynthesis of steroids and terpenes, plant aromatics, amino acids, porphyrins and other aspects of nitrogen metabolism. Spring. Mr. Sondheimer.

*Prerequisites*: F Chem 221 & F Chem 223 or equivalent and Chem 346 & Chem 356 as pre- or co-requisite, and F Chem 530.

### 539. PRINCIPLES OF BIOLOGICAL CHEMISTRY

*3 credit hours*

Three hours of lecture. Principles of biochemistry with emphasis on their relationship to biology. Topics include basic metabolic pathways, structure and function of proteins, enzymes, and nucleic acids, energy relationships, and biochemical control mechanisms. Fall. Mr. Walton.

*Prerequisites*: A two-semester course in organic chemistry desirable, but a one-semester course is acceptable. This course not open to For. Chemistry majors.

### 550. INTRODUCTION TO POLYMER CHEMISTRY I

*3 credit hours*

Three hours of lecture. Mechanism and kinetics of condensation and addition polymerization; stereochemistry of macromolecules; chain statistics and polymer solution theory; molecular weight determination and hydrodynamic properties; polyphase structure of natural and synthetic polymers. Fall. Mr. Smid.

*Prerequisites*: F Chem 221 & F Chem 223, Chem 246 & Chem 356.

### 551. POLYMER TECHNIQUES

*2 credit hours*

One hour lecture-discussion and three hours of lab; lab reports. Techniques of polymer preparation: free radical (solution and emulsion), catalytic and radiation polymerizations. Physical characterization: polarized microscopy, light scattering, ultracentrifugation, viscosity. Rubber elasticity: modulus determination, molecular weight between crosslinks swelling equilibrium. Fall. Mr. Sarko.

*Prerequisites:* F Chem 221 & 223, Chemistry 346 & Chemistry 356, concurrent F Chem 550.

### 552. INTRODUCTION TO POLYMER CHEMISTRY II

*3 credit hours*

Three hours of lecture. Polymer types: chemical and physical classification, physical and mechanical properties, relation to end use. Manufacturing and fabricating processes for fibers, films, and plastics. Local field trips. Spring. Mr. Sarko.

*Prerequisites*: F Chem 221 & F Chem 223, Chem 346 & Chem 356.

### 556. POLYMER PROPERTIES

*3 credit hours*

Three hours of lecture. Introduction to the physical chemistry of polymers. Includes a description and classification of polymers, crystallization, glass transition, statistics of macromolecules, rubber elasticity, visco-elasticity, polymer solutions, phase equilibria, viscosity, properties of fibers, fibers, foams, composites. Electrical and optical properties of polymers. Fall. Mr. Smith.

*Prerequisite*: One year Organic (FC 221, 223), one year Physical Chem. (346, 366)

### 571. CELLULOSE, WOOD AND PULPING CHEMISTRY

*3 credit hours*

Three hours of lecture. Introduction to carbohyrate chemistry. Chemistry of cellulose, hemicelluloses, pectin, starch, and lignin. Wood extractives. Effect of acid, alkali, and oxidizing agents on lignin and wood polysaccharides. Chemistry and topochemistry of the technical pulping and bleaching processes in relation to wood. By-products in the pulping industry, manufacture of acetate and rayon, and chemical utilization of wood. Fall. Mr. Timell.

*Prerequisites*: F Chem 221 & F Chem 223 and F Chem 222 & F Chem 224, or equivalent.

*Note*: A student will not normally enroll in both F Chem 571 and F Chem 572; in the exceptional case, the maximum credit hours earned will be 5.

### 572. CHEMISTRY AND BIOCHEMISTRY OF WOOD

*3 credit hours*

Three hours of lecture. Introduction to carbohydrate chemistry. Chemistry of cellulose, hemicelluloses, pectin, starch, and lignin. Wood extractives. Distribution of the major cell wall components. Photosynthesis and biosynthesis of wood polysaccharides and lignin. Cambium chemistry. Aging and biological degradation of wood. Abnormal wood, chemistry of bark, and biochemical evolution of wood. Fall. Mr. Timell.

*Prerequisite*: F Chem 221 & F Chem 223 and F Chem 222 & F Chem 224, or equivalent.

*Note:* A student will not normally enroll in both F Chem 571 and F Chem 572; in the exceptional case, the maximum credit earned will be 5.

### 573. CELLULOSE AND WOOD CHEMISTRY LABORATORY

*1 credit hour*

Wood analyses. Isolation and characterization of wood components. Preparation of cellulose derivatives. Modern chromatographic techniques for separation and analysis of wood constituents. Polarimetry. One lab period. Fall. Mr. Timell.

*Prerequisites*: F Chem 221 and F Chem. 223; concurrent: F Chem 571.

### 584. SPECTROMETRIC IDENTIFICATION OF ORGANIC COMPOUNDS

*1–2 credit hours*

Two hours of lecture and discussion. The first half semester (1 credit) will deal with common classes of organic compounds; the second half semester (1 credit) will deal with more complex structures. The use of complementary information from mass, infrared, nuclear magnetic resonance and ultra violet spectrometry will be applied to identification of organic natural products. Fall or Spring. Mr. Silverstein.

*Prerequisites*: Organic Chemistry; one semester of advanced organic for second credit.

### 796. SPECIAL TOPICS IN CHEMISTRY

*1–3 credit hours arranged according to nature of topic*

Lectures, conferences, and discussion. Advanced topics in physical chemistry, organic chemistry, or biochemistry or in the chemstry of cellulose, wood or polymers. Fall & Spring. Staff.

### 798. RESEARCH IN CHEMISTRY

*Credit hours arranged according to nature of problem*

Problems in the physical and organic chemistry of synthetic polymers and in the physical, organic, and biochemistry of polymeric wood components and natural products are assigned. One typewritten report (original and three carbons) required. Fall & Spring. Staff.

Prerequisites depend upon the problem.

### 830. TOPICS IN PLANT BIOCHEMISTRY

*3 credit hours*

Three hours lecture and discussion. Covers topics in biochemistry unique to plants, including photosynthesis, biosynthesis of cell-wall components, phenolics, terpenes, nitrogen metabolism, structure and function of plant hormones, biochemistry of differentiation and growth regulatory mechanisms. Fall & Spring (alternate years). Mr. Walton.

*Prerequisites*: F Chem 530, F Chem 532, or equivalents.

### 850. ORGANIC CHEMISTRY OF POLYMERS

*3 credit hours*

Three hours of lecture, discussion and recitation. A broad survey of polymer forming reactions and polymeric structures. Some relations between molecular structure and useful properties. Special problems in stereochemistry and polymerization mechanisms. Spring. Mr. Schuerch & Mr. Bracke.

*Prerequisites*: F Chem 221, F Chem 223, & F Chem 550.

### 855. PHYSICAL CHEMISTRY OF POLYMERS

*3 credit hours*

Three hours of lecture and discussion. Statistics of chain configurations. Thermodynamics of polymer solutions: solubility behavior, fractional precipitation, molecular weights, cross-linking and swelling. Kinetic theory of rubber elasticity. Birefrigence of rubber-like networks. The crystalline state. Spring. Mr. Sarko & Mr. Smith.

*Prerequisites*: F Chem 550, Chemistry 646 & Chemistry 656.

### 884. ORGANIC NATURAL PRODUCTS CHEMISTRY

*3 credit hours*

Three hours lecture. The chemistry of terpenoids, steroids and alkaloids with an emphasis on the determination of structure by both modern instrumental methods and chemical degradation. Biogenetic considerations and the confirmation of structure by synthesis are covered. Fall or Spring. Mr. LaLonde.

*Prerequisites*: One semester of advanced organic chemistry.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 997. SEMINAR

*1 credit hour*

Discussion of recent advances in chemistry. Fall & Spring. Messrs. Baum and Szwarc.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## ECONOMICS (FORESTRY ECONOMICS)

### 290. INTRODUCTION TO ECONOMICS FOR FORESTRY

*3 credit hours*

Three hours of lecture and discussion. Population and resources. Trends in the American economy. Supply and demand. Theory of the firm and industry. Composition, measurement, and determination of national income. Monetary and fiscal policies. The roles of government, business and labor. Comparative economic systems. General economic principles are stressed. Fall and Spring. Mr. Petriceks.

### 300. INTRODUCTION TO MACROECONOMICS

*3 credit hours*

Three hours of lecture and discussion. Composition, measurement, and determination of national income. Business cycles in the American economy. Financial institutions of the United States. Monetary and fiscal policies. The Theory of Economic Growth and problems in attaining adequate levels of economic growth. Spring. Messrs. Bennett & Petriceks.

### 301. INTRODUCTION TO MICROECONOMICS

*3 credit hours*

Three hours of lecture and discussion, Pricing and resource allocation. Supply and demand. Theory of the firm and industry. The role of labor unions in the American economy. Problems in anti-trust policy. The Theory of International Trade. Fall. Mr. Bennett & Staff.

### 510. PRINCIPLES OF FORESTRY ECONOMICS

*3 credit hours*

Two hours of lecture, three hours of laboratory. Economics of the production of forest goods and services. Land, labor and capital and their combination in forest production. Supply and demand of various forest products and their changes over time. Economics of taxation and public policy formation. Emphasis is placed upon principles and methods of analysis useful in understanding and in making resource management decisions. Fall. Mr. Christiansen.

*Prerequisite*: F Econ 301 or equivalent.

### 511. ECONOMICS OF THE FOREST BUSINESS

*3 credit hours*

Two hours of lecture, three hours of laboratory. Economic evaluation of alternative uses of land, labor, and capital in the operation of forest properties and related marketing and processing enterprises. Emphasis is on application of principles and methods of economic analysis. Part of the term is spent in appraising a forest property and preparing a plan for its operation. Complementary to instruction in FM 556. Spring. Mr. Christiansen.

*Prerequisite*: F Econ 510 or permission of the instructor.

### 520. ECONOMICS OF WOOD-USING INDUSTRIES

*3 credit hours*

Three hours of lecture and discussion. Structure and organization of selected wood-using industries. Analysis of decision-making by the firm. Principles of production and marketing including demand and cost analysis and pricing. Special issues and current problems of the industries, and introduction to the newer mathematical and statistical tools for meeting them. Spring. Mr. Armstrong.

*Prerequisite*: F Econ 290 or equivalent.

### 710. ADVANCED PRINCIPLES OF FORESTRY ECONOMICS I

*3 credit hours*

Two hours of lecture, two hours of discussion. Intensive study of the micro-economics of forestry. Offered only to graduate students. Fall. Mr. Duerr.

### 711. ADVANCED PRINCIPLES OF FORESTRY ECONOMICS II

*3 credit hours*

Two hours of lecture, two hours of discussion. Intensive study of the macro-economics of forestry. Offered only to graduate students. Spring. Mr. Duerr.

### 796. SELECTED TOPICS IN THE ECONOMICS OF FORESTRY

*Credit hours to be arranged*

Study of a topic in forestry economics, with emphasis on wide reading, original thinking, and analytical writing. Fall & Spring. Staff.

### 797. SEMINAR

*1–3 credit hours*

Group discussion and individual conference. Critical examination of economic ideas and policies in forestry. Topics of interest to the group are selected for study, such as current developments in analytical method or in economy policy, the economic problems of small business in forestry, national or world requirements for the goods and services of the forest, or the economy of a forest region. Primarily for graduate students in forestry economics and world forestry. Fall & Spring. Mr. Miller.

### 800. HISTORY OF ECONOMIC THOUGHT IN FORESTRY

*3 credit hours*

Three hours of discussion or confernce. Systematic study and critique of the development of the thinking of foresters and economists with respect to some segment of the subject matter of forestry economics. Review of major individual contributions to thought and the influence of leading scholars upon the thinking of others. Appraisal of the leading schools of thought. Offered only to graduate students. Fall or Spring. Mr. Bennett.

### 830. RESEARCH METHODS

*3 credit hours*

Three hours of discussion or conference. Study of the standard techniques for developing and testing hypotheses in social science. Analysis and critique of completed research. Fall. Mr. Duerr.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## ENGINEERING (FOREST ENGINEERING)*

### 301. PLANE AND GEODETIC SURVEYING

*3 credit hours*

Two hours lecture and recitation, three hours of lab. A treatment in depth of the principles of plane surveying, with particular emphasis on the analysis of errors, curvilinear survey, astronomical observations and potential computer relationships. Spring. Staff.

*Prerequisite*: A M 591.

### 310. ROADS

*3 credit hours*

Two hours of lecture, three hours of field and laboratory practice. Engineering principles in the planning, location, design, construction, and maintenance of forest roads. Contract specifications, costs, drainage, typical sections, grades, curves, surfacing materials, use of heavy equipment, and explosives. Principles in the location, installation, and maintenance of communications. Spring. Mr. Koten.

*Prerequisite*: F Mgt 201 or F Engr 301.

### 340. HYDROLOGY

*3 credit hours*

Two lectures and three hours of lab per week. The mechanics of water storage and dispersion; hydrostatics; stream function; velocity potential; dimensional analysis and momentum theory. The natural hydrologic cycle is studied in relationship to changes and structural controls imposed by man. Spring. Mr. Tully.

*Prerequisites*: Dynamics (or concurrent), Introductory Statistics.

### 410. STRUCTURES

*3 credit hours*

Two hours of lecture, three hours of lab. Engineering principles in the planning, design, construction, and maintenance of forest structures such as timber bridges, trusses, towers, dams, water supplies, sewage systems, and other facilities. Properties of timber, concrete, steel, and other structural materials. Fall. Mr. Tully.

*Prerequisite*: M E 225.

### 412. PRINCIPLES OF PRODUCTION (HARVESTING)

*3 credit hours*

Three lectures per week. Fundamentals of harvesting wood products for optimum utilization; principles of production management, materials handling and transportation systems, inventory and cost control, product and market development; utilization problems. Analysis of integrative case situations for wood-based enterprises. Fall. Mr. Palmer.

*Prerequisite*: F Mgt 522.

### 502. TERRESTRIAL GEODESY

*3 credit hours*

Two hours lecture and three hours laboratory. Theory and techniques of collection, reduction, and adjustment of precise geodetic measurements for leveling, triangulation, and trilateration. Fall. Mr. Lanckton.

*Prerequisites*: F Engr 301 or equivalent.

### 503. ASTRO-GEODESY

*3 credit hours*

Two hours lecture and three hours laboratory. Theory and techniques of collection, reduction, and adjustment of astronomical observations for position, direction, and time determination with emphasis on satelite geodesy. Spring. Mr. Lanckton.

*Prerequisite*: F Engr 301 or equivalent.

### 530. SOIL MECHANICS

*2 credit hours*

Two hours of lecture, three hours of laboratory (9 weeks only). The physical, mechanical and hydraulic properties of cohesive and noncohesive soils. A nine-week course, concluding with specifications of engineering soils. Credit towards forest engineering degree may be granted only by the completion of additional assigned work. Fall. Mr. Tully.

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*See also listings for Forest Management.

*Prerequisite*: Senior class standing or permission of instructor.

*Note*: A student may not enroll in and receive credit for both F Engr 530 and F Engr 531.

### 531. SOIL MECHANICS FOR ENGINEERS

*3 credit hours*

Two hours of lecture, three hours of lab. The physical, mechanical, and hydraulic properties of cohesive and noncohesive soils. Application of these and other engineering principles to the design of earthen structures common to the forest environment. Fall. Mr. Tully.

*Prerequisites:* F Engr 340; also, C E 325 concurrently.

*Note*: A student may not enroll in and receive credit for both F Engr 530 and 531.

### 540. HYDROLOGIC CONTROLS

*3 credit hours*

Three hours of lecture and discussion. A continuation of F Engr 340, emphasizing the application of hydrologic principles. Basic hydraulics of controlling structures, open channel flow, sedimentation, filtration systems, reservoirs and water law as applied to forest and range land hydrology. Spring. Mr. Tully.

*Prerequisites*: F Engr 340, F Engr 530 or F Engr 531, C E 327 or equivalents as evaluated by the instructor.

### 563. PHOTOGRAMMETRY

*3 credit hours*

Two hours of lecture and discussion, three hours of lab. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation, and unique requirements are considered. Fall & Spring. Mr. Stanton.

*Prerequisites*: F Mgt 201 (or F Mgt 301 concurrent).

### 566. REMOTE SENSOR INTERPRETATION

*3 credit hours*

Two hours of lecture, three hours of lab. An introduction of remote sensing technology as applied to detection and analysis of the forest environment, soil, water, climate, and vegetation, as an aid to multiple use management. Fall. Mr. Lanckton.

*Prerequisite*: F Engr 563.

### 567. REMOTE SENSOR THEORY

*3 credit hours*

Two hours lecture and three hours laboratory of an in-depth coverage of the theory of remote sensing of the electro-magnetic spectrum and the various methods of phase and amplitude recording. Holographic, photographic, and line scan recordings will be covered. Spring. Mr. Lanckton.

*Prerequisites*: F Engr 563, Math 398 or equivalent.

### 664. TERRESTRIAL AND NON-TOPOGRAPHIC PHOTOGRAMMETRY

*3 credit hours*

Two hours of lecture, three hours of laboratory per week. The theory and applications of terrestrial and non-topographic photo measurements. Photo-Theodolites, short-focus cameras, and microscopes are used and calibrated to provide meaningful quantitative data from photographs. Spring. Mr. Brock.

*Prerequisites*: F Engr 563 and A M 565 or equivalent.

### 760. ANALYTICAL PHOTOGRAMMETRY I

*3 credit hours*

Two hours of lecture, three hours of lab per week. Mathematical theory of photogrammetry including space resection, orientation, intersection and aerial triangulation. Fall. Mr. Brock.

*Prerequisites*: F Engr 563 and A M 565 or equivalent.

### 761. ANALYTICAL PHOTOGRAMMETRY II

*3 credit hours*

Two hours lecture, three hours lab. A continuation of Forest Engineering 760 leading to more extensive analytical solutions with frame and non-conventional photography. The distortions present in photographs are analyzed and camera and comparator calibrations are treated. Spring. Mr. Brock.

*Prerequisite*: F Engr 760.

762. INSTRUMENTAL PHOTOGRAMMETRY I

*3 credit hours*

Two hours of lecture, three hours of lab. The theory and practice of extracting information from photographs with the aid of photogrammetric plotters. Fall. Mr. Brock.

*Prerequisite*: F Engr 563 or equivalent.

763. INSTRUMENTAL PHOTOGRAMMETRY II

*3 credit hours*

Two hours lecture, three hours lab. The major subjects of study are photogrammetric optics, the theory and design of optical and mechanical plotters and automatic mapping systems. Spring. Mr. Brock.

*Prerequisite*: F Engr 762 or permission of instructor.

## ENGLISH (COLLEGE OF FORESTRY COURSES)

210. ADVANCED COMPOSITION AND LITERATURE

*2 credit hours*

Further development of reading and writing skill begun in Freshman English. Appreciation of imaginative literature is extended by the study of various literary types — fiction, poetry and drama — with special attention to their specific nature and to the development of the skills of interpreting such works. Practice in the principles and techniques of writing, with assignments coordinated with the reading materials, is carried on throughout the course. Fall. Staff.

211. TECHNICAL WRITING

*2 credit hours*

The basic feature, characteristics, and forms of technical discourse, with special attention to such expository forms as the abstract, definition, explanation of a process, and technical description in preparation for the writing of a long report dealing with an investigation. Practice is also given in the writing of various kinds of short reports and selected business letters. Spring. Staff.

## ENTOMOLOGY (FOREST ENTOMOLOGY)*

300. PRINCIPLES OF FOREST ENTOMOLOGY

*2 credit hours*

Elements of insect classification, living requirements, and control manipulations that are prerequisite with further study, to an understanding of insects in relation to applied aspects of forestry. One hour of lecture, three hours of lab/field work. Spring. Mr. Allen & assistants.

500. ELEMENTS OF FOREST ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab/field work. General classification of insects, morphology, physiology, ecology, behavior, and basic principles of population control. Emphasis through illustration is on the role of insects in the forest environment. Fall. Mr. Simeone & assistants.

*Prerequisites*: F Bot 100 and F Zool 100.

502. FOREST ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab/field trip. Important forest insects and their relation to forest stands, management and silviculture practices and forest uses. Spring. Mr. Krall.

*Prerequisites*: F Ento 500 or F Ento 300.

503. SHADE TREE ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab/field trip. Common insects of woody ornamentals are stressed. Relation of environment to insect attack. Modern methods, equipment, control and prevention. Spring. Mr. Krall. Course offered in odd calendar years.

*Prerequisite*: F Ento 500 or F Ento 300.

504. INSECTS AFFECTING FOREST PRODUCTS

*3 credit hours*

Two hours of lecture and one hour of lab. Biology, chemistry, identification, prevention of injury, and control of insects injurious to forest products and wood in use. Spring. Mr. Simeone.

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*See also listings for Forest Biology.

*Prerequisite:* F Ento 500 or F Ento 300. Exceptions with permission of instructor.

### 505. SURVEY OF ENTOMOLOGICAL LITERATURE AND HISTORY

*1 credit hour*

One hour of lecture. A survey of history of entomology and related sciences. Library techniques and literature sources are discussed, with emphasis on entomological bibliography. Spring. Mr. Brezner.

### 550. FOREST AND AQUATIC INSECTS

*2 credit hours*

The forest and aquatic insects of Cranberry Lake Region and their role in these environments and habitats. Insect collection required. Summer (four-week period), Cranberry Lake Field Biology Station. Mr. Krall.

*Prerequisites:* Background in botany, zoology, systematics and ecology.

### 580. INSECT MORPHOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. A comparative study of external morphology of insects; modifications of homologous parts; musculature associated with feeding, locomotion, reproduction, and intersegmental movements. Fall. Mr. Kurczewski.

*Prerequisite*: F Ento 500.

### 610. GENERAL INSECT TAXONOMY

*3 credit hours*

Two hours of lecture, three hours of laboratory. Nomenclature, classification, literature, and keys. Insect collection required. Spring. Mr. Kurczewski.

*Prerequisites:* F Ento 500, F Ento 580.

### 620. AQUATIC ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. The biology, ecology, and identification of fresh water insects, with emphasis on the role of aquatic insects in the hydrobiome. Fall. Mr. Brezner.

*Prerequisite:* F Ento 500 or its equivalent.

### 630. INSECT PHYSIOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Study of the life processes in insects; introduction to modern physiological instrumentation and laboratory methods. Spring. Mr. Brezner.

*Prerequisite*: F Biol 330.

### 660. INSECT TOXICOLOGY

*3 credit hours*

Two hours of lecture, three hours of laboratory. The mode and basis of action of various insecticides, phenomena of biotransformation, selectivity, resistance, synergism and dosage-mortality relationships. Spring. Mr. Nakatsugawa.

*Prerequisite*: F Biol 330, or equivalent course in physiology or biochemistry.

### 720. INSECT ECOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab/field work. Interacting environmental factors which influence the relative abundance and distribution of forest insects, ecological principles as applied to problems in forest entomology, and pest management. Introduction to theories of population regulation and the study of the dynamics of forest insect population; individual problem and seminar. Fall. Mr. Allen.

*Prerequisites*: F Ento 500, F Zool 520, or equivalents.

### 796. SPECIAL TOPICS IN FOREST ENTOMOLOGY

*Credit hours arranged according to nature of work*

Special instruction, conference, advanced study and research projects in the fields of insect toxicology, insect physiology, taxonomy of immature insects, phases of biology and ecology of insects. Typewritten report required in some fields. Fall & Spring. Staff.

### 797. SEMINAR

*1 credit hour*

Assigned reports and discussion of topics in entomology. Fall & Spring. Staff.

### 798. RESEARCH PROBLEMS IN FOREST ENTOMOLOGY

*Credit hours arranged according to nature of problem*

Comprehensive report required in some projects. Fall & Spring. Staff.

### 810. ADVANCED FOREST INSECT TAXONOMY

*3 credit hours*

Two hours of lecture, three hours of lab. Classification of the important groups of bark and wood boring forest insects. Fall. Mr. Krall.

*Prerequisites*: F Ento 500, F Ento 580, & F Ento 610.

### 880. HISTOLOGICAL TECHNIQUE

*3 credit hours*

One hour of conferences, six hours of lab. Methods used in preparation of insect material for microscopic study. Given in even calendar years. Spring.

*Prerequisites*: F Ento 500, F Ento 580.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## GENERAL FORESTRY

### 100. FOREST RESOURCES AND THEIR USE

*3 credit hours*

Lectures, recitation and a field study dealing with forest land, forest products and services and their use by man. The relation of forestry to other forms of land use and the multiple use of forest land are examined. The development of forestry in the United States and other countries is studied in its relation to the welfare of rural people and to the national economy. Fall. Staff.

### 502. INTERPRETING FORESTRY TO THE PUBLIC

*3 credit hours*

Two hours of lecture, three hours of lab. The principles of communication for forest extension and conservation education. The common audio-visual and printed-message media are covered. Specific topics include principles and techniques involved in lectures, demonstrations, exhibits, flip charts, slide talks, motion pictures, and television. Units of study concerning news coverage through the press, developing public relations and the role of information-education specialist in forestry, recreation and conservation are included. Spring. Mr. Hanselman & Staff.

### 550. RANGE MANAGEMENT

*2 credit hours*

Two hours of lecture, range ecology, animal husbandry, management practices and administrative aspects of range resources. Spring.

### 751. WORLD FORESTRY

*3 credit hours*

Three hours of lecture and discussion. Introduction to the principal features of the forest situation and major developments and problems in forest resource use that confront the world today. World politics and economics in relation to the availability and use of natural resources. World forest geography; forest resources and values, forestry policy and administration; world trade in forest products; current issues and problems. World forestry goals; international cooperation in forestry; role of the United States in world forestry affairs. Fall. Mr. Larson. Open only to seniors and graduate students.

### 798. PROBLEMS IN WORLD FORESTRY

*Credit hours to be arranged*

Provides an opportunity for the student to pursue his study of forestry, or some phase thereof, in a global, regional or national (United States and Canada excluded) setting, and to gain experience in original thinking and analytical writing. Fall & Spring. Mr. Larson. For graduate students, primarily, in World Forestry.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## LANDSCAPE ARCHITECTURE

### Graphics

181. GRAPHICS I

*2 credit hours*

Two three-hour drafting room periods. Elements of perspective, isometric, oblique, and orthographic projection. Practical applications of these principles are utilized in the symbols and elements of machine, architectural and topographic drawing. Spring. Mr. Maraviglia.

280. TECHNICAL DRAWING

*1 credit hour*

One three-hour drafting room period. Elements of perspective, isometric, oblique and orthographic projection. Practice in free hand and instrument drawing. Fall. Mr. Maraviglia.

282. GRAPHICS II

*2 credit hours*

One hour lecture, three hours lab per week. Lectures, discussion and drafting. Perspective, color, freehand and mechanical line drawing, rendering. Fall. Messrs. Viertel and Schaal.

*Prerequisite:* Graphics 181 or equivalent.

283. GRAPHICS III

*2 credit hours*

One hour lecture, three hours lab per week. Lectures, discussion and drafting. Perspective, freehand and mechanical line drawing, shades and shadows, rendering, practice with a variety of media, reproduction methods. Spring. Messrs. Viertel and Schaal.

*Prerequisite:* Graphics 282 or equivalent.

380. PENCIL TECHNIQUE

*1 credit hour*

Three hours of lab per week. Lab, field trips and criticism, composing and rendering finished pencil studies. Fall. Mr. Earle.

381. WATER COLOR

*1 credit hour*

Three hours of lab per week. Lab, field trips and criticism, composing and painting in water color. Spring. Mr. Earle.

480. OIL PAINTING

*1 credit hour*

Laboratory, field trips and criticism. Composing studies in oil and other color media. Spring. Mr. Earle & Staff.

*Prerequisite*: Graphics 381 or the permission of the instructor.

### Environmental Influences

111. PRINCIPLES OF LAND USE

*3 credit hours*

Three hours of lecture-recitation. Explanation of factors which influence the use, development and control of land. Discussion of government's role in land development and control. Detailed consideration of unique values of land, competitors for the use of space, classification of land resources and similar topics. Spring. Mr. Curry.

370. HISTORY OF ARTS I

*3 credit hours*

Three one-hour lectures each week, assigned reading, reports. Comparative study of those cultural periods most important in the development of Western Civilization from the Primitive through the Middle Ages, as revealed through the visual arts. A study of art as man's selected environment with special emphasis on historic garden art, urban architectural planning, and historic aspects of the landscape environment up until 1400 A.D. Fall. Mr. Earle.

371. HISTORY OF ARTS II

*3 credit hours*

Three one-hour lectures each week, assigned reading, reports. Comparative study of the important cultural periods of the West from the Renaissance to Modern times as revealed through the visual arts. A study of art as man's selected environment with special emphasis on historic aspects of the landscape environment. Brief summaries of Latin American and Japanese art and landscape architecture supplement the European and United States progression of styles. Spring. Mr. Earle.

### 511. PRINCIPLES OF OUTDOOR RECREATION

*3 credit hours*

Lectures, assigned readings, oral reports. Discussion of the importance of outdoor recreation in modern society and factors which contribute to the need for outdoor recreation. Description of types of recreational facilities and the organizations which provide them. Explanation of economic, social and political relationships in outdoor recreation. Spring.

*Prerequisite*: Open only to juniors, seniors, or graduate students.

### 550. LAND PLANNING

*3 credit hours*

Lectures, assigned readings, oral reports, term project. Discussion of the meaning and purposes of land planning, giving specific reference to the contributions of urban and regional planning. Examination of the historical development of urban forms. Explanation of the principal elements of comprehensive plans, including planning administration. Fall.

*Prerequisite*: Open only to juniors, seniors, or graduate students.

### 571. HISTORY OF LANDSCAPE ARCHITECTURE

*2 credit hours*

Lectures, assigned reading, reports, sketches. Comparative study of the important cultural periods of Western history as seen through landscape architecture and garden art. Landscape architecture will be studied as a planned environment of man. Spring. Mr. Earle.

*Prerequisites*: Standard art history course equivalent to 6 credits or permission of instructor.

## *Landscape Architecture*

### 220. BASIC DESIGN I

*3 credit hours*

Two lectures and three hours of lab per week. Lectures, abstract design exercises, assigned readings, and reports. Study of the principles of aesthetics, and the mechanics of the visual design process. Familiarization with graphic design terminology and introduction to landscape architecture as design. Fall. Mr. Earle & Mr. Curry.

### 221. BASIC DESIGN II

*3 credit hours*

Two lectures and three hours of lab per week. Lectures, abstract design exercises and projects, assigned readings, and reports. Study of the philosophy of aesthetics as it applies to landscape architecture. Familiarization with naturalistic and urban environmental concepts and the social and individual attitudes they serve. Readings in creativity, naturalism, urbanism, individualism, and sociology. Spring. Mr. Earle & Mr. Curry.

### 231. PLANT MATERIALS I

*3 credit hours*

Three weeks at Farmingdale, New York, beginning the second week of final examinations for Spring term. The student's expenses for the three weeks are $100–120. Field trips and discussion. Ornamental woody plant identification on and in the vicinity of Long Island. Observation and sketches of outstanding examples of planting design. Messrs. Viertel & Freeman.

*Prerequisites*: LA 220 & LA 221, F Bot 100.

### 241. LANDSCAPE ARCHITECTURAL CONSTRUCTION I

*3 credit hours*

Two hours of lecture and three hours of lab per week. Lectures, problems, drafting, modeling, and assigned reading. The study of land form and its technical expression through grading plans, sections, profiles and earth work quantity computation. Principles of soil mechanics and land drainage and their application to surface and subsurface drainage systems. Spring. Mr. Freeman.

*Prerequisites*: Plane Surveying, Elementary Geology.

### 320. LANDSCAPE DESIGN I

*6 credit hours*

Two hours of lecture and 12 hours of lab per week. Lectures, problems, presentations, and field trips. A succession of problems emphasizing basic design principles specifically as they relate to landscape architecture. Basic principles of analysis and synthesis, land organization, composition of elements, and aesthetic-functional relationships are stressed. Fall. Mr. Reimann & Staff.

*Prerequisites*: LA 241, LA 221, LA 231, and GR 283, or equivalents.

*Note*: Student's expenses for an extended field trip approximately $100.

### 321. LANDSCAPE DESIGN II

*6 credit hours*

Two hours of lecture and 12 hours of lab per week. Lectures, problems, presentations, and field trips. A continuation and intensification of the work in LA 320. Succession of problems more specifically related to natural landscape architectural problems (such as small parks, schools, and other site design projects) introductory to professional attitudes and work. Spring. Mr. Reimann & Staff.

*Prerequisites*: LA 320, LA 330, & LA 340.

### 330. PLANT MATERIALS II

*2 credit hours*

Two hours per week and integration with Landscape Design problems. Field study, lectures, and drawing. Trees, shrubs, and vines. Identification and design considerations. Fall. Mr. Viertel.

*Prerequisites:* F Bot 100, LA 231, or equivalent.

### 331. PLANT MATERIALS III

*2 credit hours*

Two hours per week and integration with Landscape Design problems. Field study, lectures, and drawing trees, shrubs, vines, and grasses. Identification and culture. Spring. Mr. Viertel.

*Prerequisite*: LA 330.

### 340. LANDSCAPE ARCHITECTURAL CONSTRUCTION II

*2 credit hours*

Two hours lecture per week. Lectures, problems, assigned readings and field trips. Engineering principles, construction materials and operations common to landscape architecture. Topics include elementary statics and strength of materials, concrete, masonry, and other materials of construction. Fall. Mr. Johst.

*Prerequisite*: LA 241.

### 341. LANDSCAPE ARCHITECTURAL CONSTRUCTION III

*2 credit hours*

Two hours of lecture per week. Continuation of LA 340. Topics include water supply, sewage disposal, foundations, retaining walls, dams, shore protection, beaches, swimming pools, and pedestrian pavements. Spring. Mr. Sears & Mr. Johst.

*Prerequisites:* LA 320, LA 340.

### 460. ARCHITECTURE I

*3 credit hours*

One hour of lecture, six hours of lab per week. Lectures, written assignments, and drafting. Methods of architectural design and construction. Modular design, structural systems, drafting of architectural details. Architecture, site and area relationships. Design philosophies, responsibilities and relationships of the design professions. One to three week lab problems in architectural design preparation of presentation and working drawings. Fall. Staff.

*Prerequisites*: GR 282, GR 283.

### 461. ARCHITECTURE II

*3 credit hours*

One hour of lecture, six hours of lab per week. Continuation of Architecture I.

### 520. LANDSCAPE DESIGN III

*6 credit hours*

Two hours lecture, 12 hours lab per week. Lectures, seminars, design projects, field trips and reports. Continuation of landscape architectural design problems with varied but urban-oriented sequence, stressing development of professional procedure and responsibility. Application of extended knowledge in construction and plant materials. Relation of the concepts and practice of landscape architecture to architecture, engineering and city and regional planning. Fall. Mr. Reimann & Staff.

*Prerequisites*: LA 320, LA 321, LA 331, & LA 341.

*Note*: Student's expenses of an extended field trip are approximately $100.

### 521. LANDSCAPE DESIGN IV

*6 credit hours*

Two hours lecture, 12 hours lab per week. Continuation of the work as described for LA 520 including an extended problem at a regional scale developing a comprehensive view of urban and regional planning principles in landscape architecture. Discussion of design philosophies and practice procedures to complete the undergraduate study and preparation for professional work. Spring. Mr. Reimann & Staff.

*Prerequisites*: LA 520, LA 540.

### 540. LANDSCAPE ARCHITECTURAL CONSTRUCTION IV

*2 credit hours*

Two hours lecture per week. Lectures, reports, assigned readings. Estimates, specifications, contracts, registration laws, professional ethics, contracts and fees for professionl services, and similar topics related to the practice of landscape architecture. Fall. Mr. Sears.

*Prerequisites*: LA 321, LA 341.

### 541. LANDSCAPE ARCHITECTURAL CONSTRUCTION V

*2 credit hours*

Two hours lecture per week. Lectures, problems, assigned readings, field trips. Principles of highway engineering as related to landscape architecture including location, geometric design, drainage, roadbed construction, pavements and roadside development. Spring. Mr. Sears.

*Prerequisites*: LA 520, LA 540.

### 720. LANDSCAPE DESIGN V

*4 credit hours*

Development of a major landscape design problem involving preparation of a series of related drawings. Fall. Staff.

*Prerequisites*: LA 520, LA 521.

### 721. LANDSCAPE DESIGN VI

*4 credit hours*

Continuation as described above. Further advanced project design similar to the work of LA 720. Spring. Staff.

### 730. PLANT MATERIALS IV

*2 credit hours*

Lecture, field work, trips. Special study of woody and herbaceous plant materials, greenhouse operation, and other horticultural practices. Spring. Mr. Viertel, Staff, & visiting lecturers.

### 740. LANDSCAPE ARCHITECTURAL CONSTRUCTION VI

*3 credit hours*

Lectures, drafting. Detailed study of special landscape construction problems. Preparation of estimates, contracts, and specifications. Fall. Mr. Sears & Staff.

*Prerequisite*: LA 541.

### 750. CITY PLANNING

*3 credit hours*

Lectures, reports, assigned readings, and design. Architectural, aesthetic and engineering principles. One typewritten report (original and four carbons) required. Fall.

*Prerequisites*: LA 520, LA 521.

760. PARK ARCHITECTURE

*2 credit hours*

Advanced problems in architectural design for park buildings and preparation of plans. Spring. Staff.

*Prerequisites*: LA 520, LA 460, & LA 461.

797. SEMINAR

*2 credit hours*

Discussion of miscellaneous current problems related to planning and management. Fall or Spring. Staff & visiting lecturers.

798. RESEARCH PROBLEM

*Credit hours arranged according to nature of problem*

Special study of assigned problems relating to landscape architecture or planning, with emphasis on critical thinking. Fall & Spring. Staff.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

## MANAGEMENT (FOREST MANAGEMENT)*

201. PLANE SURVEYING

*3 credit hours*

Two hours of lecture and recitation, three hours of field or office practice. A comprehensive development of the theoretical principles of plane surveying. Use of modern instruments and methods, computations related to forest activities. Fall. Staff.

*Prerequisite*: Plane Trigonometry.

303. INTRODUCTION TO FOREST MEASUREMENTS (SUMMER FIELD SESSION)

*1 credit hour*

Introduction to the concepts and practices of elementary field measurements necessary to forest survey and stand data preparation. Emphasis is given to field procedures, methods, and instruments, and to recognition of need for standards of performance. Summer Session. Staff.

340. HARVESTING

*2 credit hours*

Two hours of lecture. Principles of harvesting primary forest products. Equipment, methods, and economics of the logging industry. Spring. Mr. Koten.

497. FOREST MANAGEMENT SEMINAR

*3 credit hours*

Three hours of group discussion and analysis. Current literature, plans, and principles, and new developments in forest management. Fall. Mr. Horn.

498. PROBLEMS IN FOREST MANAGEMENT

*1 to 3 credit hours*

Independent study in special problems in Forest Management. The selection of a subject area will be determined by the student and an appropriate faculty member designated by the Department Chairman. A final written report is required for department records. Fall and Spring. Staff.

*Prerequisites*: Senior standing in Resources Management and permission of instructor.

522. MENSURATION

*3 credit hours*

Two hours lecture and discussion, one three-hour laboratory. Principles and methods of estimating and projecting net volumes of trees and products; tree form; timber volume determination of logs, trees and stands; growth determination; analyses by graphical and mathematical methods; stand structure adjustments; numerous problems. Spring. Mr. Cunia.

*Prerequisites:* AM 571 or AM 591; F Mgt 201 or F Engr 301.

540. ANALYSIS AND CONTROL OF FORESTRY OPERATIONS

*3 credit hours*

Two hours of lecture, three hours lab. Applications of scientific methods to management decision problems of forestry operations with emphasis on data sources and reliability, model formulation, inventory control, equipment replacement, simulation, and critical path scheduling and costing. Fall. Mr. Koten.

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*See also listings for Forest Engineering.

*Prerequisites*: AM 571 or equivalent, F Mgt 340 and computer programming.

### 552. MANAGEMENT PLANNING AND OPERATIONS

*3 credit hours*

Three hours of lecture and recitation. The over-all management and operation of a forest property as a productive enterprise, particularly development and expediting of cutting budgets, work plans, and operating schedules. Emphasis is on integration of principles and concepts of mensuration, silviculture, utilization, engineering, economics, administration, and human relations in the context of a practical operating land ownership. Spring. Mr. Horn.

### 554. FOREST ADMINISTRATION AND POLICY

*3 credit hours*

Three hours of lecture and recitation. Administrative and executive aspects of forestry. Public and private forest policy formulation; basic principles of organization, planning, public relations, personnel management, budget, and administrative practice. Work and organization of the major agencies engaged in forestry. Fall. Messrs. Graves & Getty.

### 556. MANAGEMENT OF THE FOREST BUSINESS

*3 credit hours*

Three hours of discussion. Overview of major business management principles and methods of operation in forestry enterprises. Emphasis is on general business concepts which forest managers must use. Actual case studies are basis of instruction. Complementary to F Econ 511. Fall or Spring. Mr. Horn.

### 558. THE LAW OF NATURAL RESOURCE ADMINISTRATION

*3 credit hours*

Three hours of lecture-discussion. An introduction to the law concerning the procedures, powers, and judicial review of public agencies responsible for the management of natural resources. Topics will include the extent of an agency's rule-making power and the rights of aggrieved parties to appeal from agency decisions. Spring. Mr. Horn.

*Prerequisites*: F Mgt 554 or equivalent course in public administration.

### 560. MANAGEMENT PRINCIPLES AND PROCESSES

*3 credit hours*

Three hours of lecture. The principles of the art of managing manpower, providing greater depth in the concepts of management covered in F M 554. Network analysis methods of management planning. Evaluation of personnel. Human relations concepts. The processes of problem recognition and decision making, with consideration of the philosophical and qualitative elements of management science and information theory and their implications. Spring. Staff.

*Prerequisite*: F M 554 or permission of instructor.

### 561. OPERATIONS COST CONTROL

*3 credit hours*

Three hours lecture. Management uses of accounting data. Essentials of cost accounting and the uses and misuses of historical cost data in management decision making. Concepts of financial analysis of past and projected cash flows, and various methods of comparing alternatives. Fall. Staff.

*Prerequisite*: Permission of instructor.

### 562. THE STRUCTURE OF MANAGEMENT DECISIONS

*3 credit hours*

Three hours of lecture. Introductory course in managerial decision making. Covers theory, concepts, and methodology of management practices and relates these to the realities of decision making. Uses the problem solving approach in preparing the prospective resource manager or administrator for an understanding of the application of decision-making models. Spring. Staff.

*Prerequisites*: F M 554 and A M 571 or equivalent and permission of instructor.

### 570. SOCIOLOGY OF OUTDOOR RECREATION

*3 credit hours*

Two hours lecture, three hours lab. Introduction to theory and research findings dealing with the sociological aspects of outdoor recreation: field work and lectures suggest administrative applications. Fall. Staff.

*Prerequisite*: An introductory course in sociology or psychology; instructor's permission.

### 710. RESEARCH METHODS IN FOREST MANAGEMENT

*2 credit hours*

Instruction of methodology in approach to and solution of problems in Forest Management research. Restricted to graduate students in Forest Management. Fall & Spring. Mr. Wenger.

### 720. ADVANCED MENSURATION

*3 credit hours*

Systematic, stratified, and cluster sampling. Photo interpretation and double sampling. Ratio, Regression, and 3P Sampling estimates. Continuous Forest Inventory (CFI) and Sampling with Partial Replacement (SPR). Matrix Algebra applications to Multiple Regression and Weighted Least Square Method. Contribution of the error in Volume Tables to the error in the final average volume estimates. Forest Inventory and its place in the Woodlands decision-making. Optimum allocation of resources to sampling trees and plots in management inventory. Fall. Mr. Cunia & Staff.

*Prerequisites*: F Mgt 522, A M 565, A M 591, A M 595.

### 752. APPLIED FOREST MANAGEMENT

*3 credit hours*

Principles and practices of forest management as applied to specific forest properties under the guidance of responsible public and private foresters. Several days are spent in the field studying forest conditions, organizations, operations, and problems. By observing actual forest operations, students become acquainted with the latest and most efficient forest practices in office and forest. Fall. Mr. Horn.

### 754. ADVANCED FOREST ADMINISTRATION

*3 credit hours*

Critical appraisal of existing public, semipublic and private forestry agencies in the United States, and the comparative study of major administrative organizations and practices. Occasional inspection trips to forestry headquarters and field units and discussion of internal administrative problems with forest officers. Spring. Mr. Getty.

*Prerequisite*: F Mgt 554 or equivalent.

### 756. MANAGEMENT CONCEPTS IN PLANNING FOREST PRODUCTION

*3 credit hours*

Three hours of lecture-discussion. The theories and principles involved in planning the annual allowable cut and the resulting yearly cutting schedules. The influence of technical decision and socio-economic pressures upon the level of cutting and the effect of the level of cutting upon the dependent industry. Fall or Spring. Staff.

*Prerequisite*: F Mgt 552 or equivalent.

### 797. SEMINAR

*1 credit hour*

Group discussion and individual conference concerning current topics, trends, and research in management. Fall & Spring. Mr. Wenger.

### 798. FOREST MANAGEMENT PROBLEMS

*Credit hours arranged according to nature of problem*

Hours to be arranged. Special study of assigned problems with emphasis on critical thinking. One typewritten report (original and one carbon) required. Fall & Spring. Staff.

### 851. OPERATIONS RESEARCH I

*3 credit hours*

Three hours of lecture. Mathematical methods applicable to the managerial process. The nature of mathematical modeling. Deterministic and statistical models. Stochastic processes, simulation, inventory control and queuing theory. Fall. Mr. Cunia.

*Prerequisites*: A M 591 or equivalent and Math 227 or equivalent.

### 852. OPERATIONS RESEARCH II

*3 credit hours*

Three hours of lecture. Continuation of F Mgt 851. Linear, quadratic and dynamic programming. Allocation and transportation problems. Game theory, competitive strategies and other operations research methods. Spring. Mr. Cunia.

*Prerequisite*: F Mgt 851.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## MATHEMATICS (COLLEGE OF FORESTRY COURSES)

### 115. PLANE TRIGONOMETRY

*3 credit hours*

Three hours of lecture. The course includes: the six trigonometric functions, the radian measure of angles, the variation and graphs of the trigonometric functions, the solution of right triangles and applications, trigonometric identities, trigonometric equations, inverse trigonometric functions, the general triangle, complex numbers, logarithms, and accuracy of computed results. Fall or Spring. Mr. Green.

### 116. COLLEGE ALGEBRA

*3 credit hours*

Three hours of lecture. The course includes a review of the axioms of algebra, the algebraic operations, inequalities, functions and their graphical representation, linear and quadratic functions, determinants, theory of equations, inverse functions, permutations, combinations and probability, the Binomial Theorem, mathematical induction, exponential and logarithmic functions and complex numbers. Fall or Spring. Mr. Green.

## PAPER SCIENCE AND ENGINEERING

### 300. INTRODUCTION TO THE PULP AND PAPER INDUSTRY

*1 credit hour*

Discussion of the historical modern development and management of the paper industry. Fall. Mr. O'Neil.

### 301. PULP AND PAPER PROCESSES

*3 credit hours*

Three hours of lecture. Introduction to pulp and paper technology with emphasis on pulping and bleaching. A study of the processes of pulping and bleaching of fibers including underlying theory. An introduction to formation and reactions of a fibrous web. Spring. Mr. Bambacht.

*Prerequisites*: Chem 332, F Chem 571.

### 302. PAPER PROCESSES LABORATORY

*1 credit hour*

One three-hour lab. Study and practice in the techniques of lab procedures normally encountered in the pulp and paper industry. Lab exercises selecting and using standard testing methods. Field trips to observe commercial equipment of the pulp and paper industry. Spring. Mr. Bambacht.

*Prerequisite*: PSE 301 (or concurrent).

### 304. MILL EXPERIENCE

*5 credit hours*

Twelve weeks full-time pulp or paper mill employment approved by the Department between the Junior and Senior years. Ordinarily, the student receives wages or salary while getting the required experience. The student must submit a comprehensive report to fulfill this requirement. An adaptability rating chart furnished by the Department is prepared by the mill for each student employed. Staff.

### 305. MILL INSPECTION REPORT

*1 credit hour*

One week inspection trip to representative manufacturers of pulp and paper, papermaking equipment, plastics, chemicals, or related products selected for demonstrating typical plant scale operations. Ultimate emphasis is on manufacture of pulp and paper. Daily discussions. Typewritten report required on termination of trip. Trip expenses are approximately $60 per student. Spring. Staff.

*Prerequisites or concurrent*: PSE 301, PSE 302, PSE 570, PSE 571, & PSE 573.

### 498. RESEARCH PROBLEM

*4 credit hours*

Twelve hours lab. The student is assigned a research problem in pulping, bleaching, refining, additives, quality control of paper or paper products or chemical engineering. The student must make a systematic survey of available literature on the assigned problem. Emphasis is on application of correct research technique rather than on discovery of results of commercial importance. The information obtained in the literature survey along with the data developed as a result of the investigation is assembled and evaluated and submitted in duplicate to his instructor. Spring. Staff.

*Prerequisites*: PSE 561, PSE 565.

### 556, ECONOMICS OF PULP AND PAPER

*2 or 3 credit hours*

Two or three hours of lecture and seminar. Structure and development of the industry and the decisions of management are explained in the light of economic principles. Current industrial trends and problems are discussed. Each student prepares an analytical report on some aspect of industry structure. Spring. Mr. Armstrong.

*Prerequisite*: F Econ 290 or equivalent.

### 561. PULPING TECHNOLOGY

*3 credit hours*

Two hours of lecture and three hours of lab. Discussion of pulping and bleaching processes: Effect of chemicals and physical variables on the wood components and pulp properties; chemistry involved. Experiments in pulping and bleaching, and pulp evaluation. Fall. Mr. Gorbatsevich.

*Prerequisites*: PSE 570, Chem 346 and Chem 356.

### 565. PAPER PROPERTIES

*5 credit hours*

Three hours of lecture, six hours of lab and discussion. Evaluation and study of the physical, optical, and chemical properties of paper and the interrelationships existing between paper manufacturing methods, papermaking additives, test results, and the ultimate properties desired in the finished paper. Fall. Mr. Strauss.

*Prerequisites*: PSE 301, PSE 302.

### 566. PAPER COATING

*3 credit hours*

Two hours of lecture, three hours of lab. Evaluation and study of the various coating processes and materials used by the paper industry to impart special properties to paper. Relationships of various components, flow properties of coating mixtures, and evaluation of their effect on coated paper properties will be studied. Spring. Mr. Strauss.

*Prerequisite*: PSE 565.

### 568. PAPERMAKING PROCESSES

*3 credit hours*

One hour of lecture, six hours of lab. Laboratory study of the papermaking process, with emphasis on operation of the semicommercial Fourdrinier paper machine. Emphasis is on the fundamentals of stock preparation, paper machine operation, evaluation of the finished product, and the collection and analysis of data to develop material and energy balance. Results of each paper machine run are evaluated in seminar-type discussions. Spring. Messrs. Strauss, Gorbatsevich, & Stenuf.

*Prerequisites:* PSE 561, PSE 565, PSE 571.

### 570. PRINCIPLES OF MASS AND ENERGY BALANCE

*3 credit hours*

Three hours of lecture. Study of the properties of steam and solving problems connected with material and energy balances. Spring. Mr. Gorbatsevich.

*Prerequisites or concurrent:* Math 227, Physics, Chem 346, Chem 356, & Chem 333.

### 571. PULP AND PAPER UNIT OPERATIONS I

*3 credit hours*

Three hours of lectures. The study of momentum, heat and mass transfer as applied to the design and operation of equipment for fluid flow, heat transfer, evaporation, humidity and air-conditioning. Emphasis is on the application of the fundamentals of these processes to the manufacture of pulp and paper. Fall. Mr. Stenuf.

*Prerequisite*: Chem 346, Chem 356.

### 572. PULP AND PAPER UNIT OPERATIONS LABORATORY I

*1 credit hour*

Three hours of lab. Lab study of fluid dynamics, heat transfer and evaporation. Emphasis is placed on the recognition of the important variables and on methods of evaluating them by experimentation and subsequent calculations. Specially designed semicommerical equipment is used. Fall. Mr. Stenuf.

*Concurrent*: PSE 571.

### 573. PULP AND PAPER UNIT OPERATIONS II

*3 credit hours*

Three hours of lecture. The study of momentum, heat and mass transfer as applied to the design and operation of equipment for sedimentation, filtration, drying, gas absorption, distillation and extraction. Emphasis is on the application of the fundamentals of these processes to the manufacture of pulp and paper. Spring. Mr. Stenuf.

*Prerequisites*: Chem 346, Chem 356, & PSE 571.

### 574. PULP AND PAPER UNIT OPERATIONS LABORATORY II

*3 credit hours*

Nine hours of lab. Lab study of humidity and air conditioning, drying, extraction, distillation, gas absorption, filtration, sedimentation, mixing, and other unit operations. Emphasis is placed on the recognition of the important variables and on methods of evaluating them by experimentation and subsequent calculation. Specially designed semicommercial equipment is used. Spring. Mr. Stenuf.

*Concurrent*: PSE 573.

### 577. PROCESS CONTROL FOR THE PAPER INDUSTRY

*3 credit hours*

Three hours of lecture. The study and application of measuring means, remote signal transmission, and control elements. Response to signals, lag, dynamic error, cycling and other process control phenomena. The use of electronic computers in the paper industry. Applications of these principles and instruments to pulp and paper industry is stressed. Fall or Spring. Mr. Stenuf.

*Prerequisites or concurrent*: PSE 301, PSE 302, PSE 571, PSE 573, Chem 346, & Chem 356.

### 775. INDUSTRIAL THERMODYNAMICS

*3 credit hours*

The study and application of thermodynamics, including the first and second law, phase relationships, thermochemistry, the production of work and equilibrium relationships. Fall. Mr. Stenuf. Course given in even calendar years.

*Prerequisites*: Chem 346, Chem 356, or equivalent.

### 778. METALLURGY AND CORROSION FOR THE PAPER INDUSTRY

*3 credit hours*

Three hours of lecture. The study and application of metallurgy and corrosion for the Pulp and Paper Industries. Fall. Mr. Stenuf. Course given in odd calendar years.

*Prerequisites*: Chem 346, Chem 356, or equivalent.

### 796. SPECIAL TOPICS

*1 to 3 credit hours*

Lectures, conferences, and discussions. Advanced topics in chemical engineering, chemistry and physics as related to fibers, pulps and paper. Fall & Spring. Staff.

### 797. SEMINAR

*1 credit hour*

Discussions of assigned topics in fields related to pulp and paper technology. Fall & Spring. Staff.

### 798. RESEARCH IN PULP AND PAPER TECHNOLOGY

*Credit hours arranged according to nature of problem*

Hours to be arranged. Problems in pulp and paper technology are assigned to properly qualified graduate students. One typewritten report (original and one carbon) required. Fall & Spring. Staff.

Prerequisites depend upon nature of problem.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## RESOURCES MANAGEMENT

304. SILVICULTURE — RESOURCE MANAGEMENT (SUMMER FIELD SESSION)

*3 credit hours*

Field exercises designed to illustrate silviculture practices applied to forest stands, followed by a sequence of field trips, case studies and discussions introducing concepts and applications of multiple use in forestry. Consideration of the effects of ownership, forest conditions, economic factors and achieving management objectives. (Summer Session Staff)

502. RESOURCES MANAGEMENT

*3 credit hours*

The interrelationships between man and forest resources and the multiple services which those resources provide; the extent and nature of responsibilities of the forester to the community and to society in his stewardship of natural resources. Spring. Staff.

798. RESEARCH PROBLEMS IN RESOURCES MANAGEMENT

*Credit hours arranged according to nature of problem*

Special investigation and analysis of resource management problems where integrative relationships of several subject aspects of forestry are a major consideration. Fall & Spring. Staff.

## SILVICULTURE

302. SILVICS (SUMMER FIELD SESSION)

*1 credit hour*

Dynamics of forest development; the species and their several characteristics — including tolerance, growth, survival, and patterns of reproduction; species interrelationships; successional trends — effects on forest stand structure. Observation of forest responses following natural catastrophe, logging, clearing, or fire. Introduction to principles of forest cover manipulation by man. Staff.

332. SOILS

*2 credit hours*

Two hours of lecture. Fundamentals of soil science with particular reference to forestry. Fall. Mr. Craul.

333. SOILS LABORATORY

*1 credit hour*

Three hours of lab to be taken concurrently with, or with permission, subsequent to Silviculture 332. Laboratory aspects of soil with particular reference to forestry. Fall. Mr. Craul.

351. METEOROLOGY AND FIRE BEHAVIOR

*3 credit hours*

Lectures and recitations in atmospheric physics and the physics and chemistry of combustion lead to discussions of fire behavior and the strategy and tactics of fire suppression. Fall. Mr. Herrington.

*Prerequisite*: Physics 103 & 104 (Calculus helpful but not required).

497. SILVICULTURE SEMINAR

*2 or 3 credit hours*

Group study of selected silvicultural problems or situations of mutual interest. Emphasis is on critical evaluation and analysis and on organization and presentation of results from individual study for group consideration. Spring. Staff.

521. PRINCIPLES OF SILVICULTURE

*3 credit hours*

Two hours of lecture and three hours of lab. The forest as a community. Site factors and forest stand dynamics. Introduction to manipulation of forest cover to meet objectives of forest owner. Spring. Mr. Berglund.

*Prerequisites*: Summer Camp, F Bot 330, or F Bot 530 concurrently, or permission of instructor.

### 524. PRACTICES OF SILVICULTURE

*3 credit hours*

Two hours of lecture and one three-hour lab or field trip. Theory and practices of silvicultural manipulation of forest stands to gain objectives of the forest owner. Emphasis is on thinning, reproduction cuttings, planting, and other silvicultural operations in their relationships to economic and ecological factors. Fall. Mr. Farnsworth.

*Prerequisite*: Silvi 521 or permission of the instructor.

### 525. ADVANCED PRACTICES OF SILVICULTURE

*2 credit hours*

Six hours of laboratory or field work. Development of silvicultural decisions in management of woodlands. Weekly trips to forest areas. Cultural plans prepared to attain assigned objectives. This course is coordinated with Silviculture 526 to provide fuller coverage of silvicultural considerations in decision-making. Spring. Mr. Lea.

*Prerequisite:* Silviculture 524.

### 526. PRINCIPLES OF REFORESTATION

*2 credit hours*

One hour lecture, three hours discussion, laboratory or field work. Elements involved in reforestation decision-making, including control of forest stand establishment through seeding or planting, seed production, handling and evaluation, seeding quality and nursery production, planting site evaluation and preparation. Course coordinated with Silviculture 525, together with which it provides broad coverage of silvicultural considerations in forest management. Spring. Mr. Richards.

*Prerequisite*: Silviculture 524 or equivalent.

### 528. REGIONAL STUDIES

*2 credit hours*

Study and analysis of the many factors that influence the silvicultural management of the important tree species of North America. These factors include importance of forest and forestry to a designated region, physiography geology, soils, climate and weather, sites and site types, ecology, problems of protection and silvical characteristics of the more important species. Spring. Mr. Farnsworth.

*Prerequisite*: Silvi 524.

### 535. FOREST SOILS

*3 credit hours*

One hour of lecture, one hour of discussion, four hours of lab, field study of forest soils. Effect of silvicultural operations on soil. Selection of tree species for planting on different soils. Tree growth and development — soil properties relationships. Methods of soil sampling and laboratory analysis. Fall. Mr. Leaf.

*Prerequisites*: Silvi 332 & 333.

### 540. PRINCIPLES OF WATERSHED MANAGEMENT

*3 credit hours*

Two hours of lecture, three hours of lab. The relation of forest and range vegetation to its environment, and its effect upon soil and water. Measurement of precipitation, runoff, erosion and other variables. Fall & Spring. Mr. Eschner & Mr. Black.

### 541. SOIL AND WATER CONSERVATION

*3 credit hours*

Lectures and discussion of principles and methods of soil and water conservation. Spring. Mr. Black.

### 542. PRACTICE OF WATERSHED MANAGEMENT

*3 credit hours*

Two hours of lecture, three hours of lab. The impact of the multiple use of forest and range lands on water yield and soil stability. Regional problems and potential solutions. Spring. Mr. Eschner.

*Prerequisite*: Silvi 540.

### 552. PHYSICAL CLIMATOLOGY

*3 credit hours*

Three hours of lecture. Survey of the elements of climate and the exchange of heat, moisture, and momentum between the earth and the atmosphere. Emphasis on climate in the vegetated layer and applications of empirical climatological procedures. Spring. Mr. Herrington.

*Prerequisite:* Permission of advisor and instructor.

### 577. FOREST TREE IMPROVEMENT

*3 credit hours*

Two hours of lecture, three hours of lab or field work. General principles and methods of tree improvement practiced in this country and abroad. Tree selection, techniques of vegetative propagation, hybridization, polyploidy, establishment of seed orchards, clonal and offspring testing and other problems. Spring.

*Prerequisite*: F Biol 570 strongly advised.

### 677. ADVANCED FOREST TREE IMPROVEMENT

*3 credit hours*

Two hours lecture and discussion, three hours lab. A study of advanced principles and techniques for genetic improvement of forest trees. Special emphasis is placed on selection and breeding for growth rates, wood quality, and insect and disease resistance. Problems of tree hybridization, racial variation, sexual reproduction, and quantitative genetics in forest trees. Laboratory training in cytology and cytogenetics, pollen germination, vegetative propagation and other problems. Independent research problems will be undertaken by the student. Fall or Spring.

*Prerequisites*: F Biol 570, Silvi 577.

### 735. FOREST SOIL FERTILITY (APPLIED STUDIES)

*2 to 4 credit hours*

Two hours of lecture, one hour of discussion. None to six hours of lab depending on number of credit hours. Influence of soil fertility on development and growth of seedlings and trees, and techniques involved to determine this influence. Chemical and biological analysis to determine levels of soil fertility. Nutrient element deficiencies and their correction by soil amendments and fertilizers. Term projects by the student will be undertaken. Spring. Mr. Leaf.

*Prerequisites:* Chem 332 & 333, F Bot 530, Silvi 535, or equivalent.

### 737. PHYSICAL PROPERTIES OF FOREST SOILS

*2 to 4 credit hours*

Two hours of lecture and one hour of discussion, and none to six hours of lab depending on number of credit hours. Relations of soil physics to tree development, and techniques involved to determine this influence. Physical analyses to determine levels of soil moisture and aeration. Soil textural and structural properties of forested soils. Term projects by the student will be undertaken. Spring. Mr. Craul.

*Prerequisites*: Silvi 332, 333, 540, 535 or their equivalents.

### 750. MICROMETEOROLOGY

*3 credit hours*

Two hours lecture and three hours of lab. A comprehensive study of the physical processes taking place in the lowest layer of the atmosphere. Primary emphasis on the turbulent transfer of heat, momentum, and water vapor and the expression of these fluxes in the microclimate. Spring. Mr. Herrington.

*Prerequisites*: Silvi 552, Physics and Calculus.

### 777. QUANTITATIVE GENETICS IN FOREST TREE IMPROVEMENT

*3 credit hours*

Two-hour lecture and discussion, three hours lab. Development of statistical models for determining heritability in forest trees. Breeding models and computer analysis application in forest genetics. Fall or Spring.

### 797. GRADUATE SILVICULTURE SEMINAR

*1 credit hour*

Three hour class discussion per week. Assigned reports and discussion of silvicultural topics. Fall & Spring. Staff.

798. RESEARCH PROBLEMS IN SILVICULTURE

*Credit hours arranged according to nature of problem*

Hours to be arranged. Fall & Spring. Staff.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall and Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## WOOD PRODUCTS ENGINEERING

304. INTRODUCTION TO FOREST PRODUCTS

*2 credit hours*

Two hours of lecture. Characteristics of the products of the forest tree and manufacture of wood products. Spring. Mr. E. Anderson.

322. MECHANICAL PROCESSING

*3 credit hours*

Two hours of lecture, three hours of lab. Primary log reduction methods and industry practices. Lumber grading. Wood cutting principles. Machining practice in secondary wood-using industries. Experience in the operation of certain primary and secondary machining equipment. Fall. Mr. Moore.

388. WOOD STRUCTURE AND PROPERTIES

*4 credit hours*

Two hours of lecture, six hours of lab. Identification variability and anatomical characteristics of wood and paper-making fibers. Uses, properties and sources of wood and fibers. Structure of wood in relation to defects, properties, and uses. Spring. Mr. deZeeuw & Staff.

*Prerequisite*: F Bot 100 or F Bot 210 & F BOT 211.

390. FIELD TRIP

*2 credit hours*

Two weeks supervised study and reporting of representative wood products industries. Spring. Staff. Required of all students in WPE. Estimated individual expenses are $100–150 while on the trip.

402. ELEMENTARY TIMBER MECHANICS

*3 credit hours*

Two hours of lecture, three hours of lab. Introduction to strength properties of wood, and wood products and other construction materials. Applications of these materials in typical construction problems. Fall. Mr. Kyanka.

*Prerequisites*: Senior standing or permission of instructor.

442. LIGHT CONSTRUCTION

*3 credit hours*

Two hours of lecture, three hours of lab. Elements of light frame construction, blueprint reading, and estimating. Fall. Mr. G. Smith.

486. ELEMENTARY WOOD TECHNOLOGY

*2 credit hours*

One hour of lecture, three hours of lab. Structure of wood in relation to defects, properties and uses. The variability of wood. Identification of major commerical U. S. timber by gross feature. Fall. Mr. deZeeuw & Staff.

497. SENIOR SEMINAR FOR WOOD PRODUCTS ENGINEERING MAJORS

*2 credit hours*

Discussion and assigned reports in current problems and new developments in wood products engineering. Fall. Mr. Anderson & Staff.

498. RESEARCH PROBLEM

*1 to 3 credit hours*

Hours to be arranged. Conferences, library, lab and/or field research on a specific problem in wood products engineering. Typewritten report (original and one carbon) required. Fall and/or Spring. Staff.

*Prerequisite*: Consent of instructor.

### 502. TIMBER MECHANICS

*4 credit hours*

Three hours of lecture and three hours of lab second semester. Mechanical properties of wood and elements of structures. Lectures, problems, and use of timber-testing equipment. Spring. Mr. Kyanka.

*Prerequisites*: Calculus, Physics

### 504. DESIGN OF WOOD STRUCTURAL ELEMENTS

*3 credit hours*

Lectures plus lab exercises. A development of the principles involved in designing structural elements in wood and practice in their application. Fall. Mr. Kyanka.

*Prerequisite*: WPE 502.

### 520. POLYMERIC ADHESIVES & COATINGS

*3 credit hours*

Two hours of lecture, three hours of lab. Physical and chemical properties of organic adhesives and surface coatings. Evaluation of application methods and performance on substrates. Spring. Mr. L. Smith.

*Prerequisite*: Junior standing.

### 522. COMPOSITE MATERIALS

*3 credit hours*

Two hours of lecture, three hours of lab. Manufacturing methods and physical properties of wood laminates, fiberboard, particleboard, plywood, paper overlays, sandwich materials, wood-polymer composites, and extruded and molded products. Fall. Mr. Moore.

*Prerequisites*: WPE 520, & WPE 526. Concurrent or prior registration in WPE 502 or 402.

### 526. FLUID TREATMENTS

*2–3 credit hours*

Two hours of lecture (2 credit hours), three hours of lab (I credit hour). Steady-state and unsteady-state flow of liquids, gases, water vapor, and heat as related to wood structure, wood preservative and fire-retardant treatments. Laboratory studies in permeability measurement, impregnation of wood with liquids, dry kiln operation, and wood preservation. Spring. Mr. Siau.

*Prerequisites*: WPE 388 and WPE 322 (WPE 322 waived when only lecture is taken).

### 544. MATERIALS MARKETING

*3 credit hours*

Three hours of lecture and discussion. Organization and operation of wholesale and retail lumber distribution agencies, policies and problems. Principles of salesmanship and their application in the American lumber industry. Spring. Mr. G. Smith.

### 566. WOOD-WATER RELATIONSHIPS

*3 credit hours*

Two hours of lecture, three hours of lab. Consideration of basic wood-water relationships and the drying of lumber and other wood products. Fall. Mr. Skaar.

*Prerequisites*: Physics, calculus, WPE 526 or equivalent.

### 570. PRODUCTION MANAGEMENT OF WOOD WORKING INDUSTRIES I

*3 credit hours*

Two hours of lecture, three hours of lab. Production planning and control. Methods engineering. Organization and other aspects of management. Includes a comprehensive lab problem dealing with a proposed plan for establishing a woodworking plant. Fall. Mr. Whitt.

*Prerequisite*: Senior status.

### 572. PRODUCTION MANAGEMENT OF WOOD WORKING INDUSTRIES II

*3 credit hours*

Two hours of lecture and three hours of lab. Factory planning and design. Plant problems in production. Operations analysis. Spring. Mr. Whitt.

*Prerequisite*: WPE 570, senior status.

### 585. MICROTECHNIQUE AND PHOTOMICROGRAPHY

*3 credit hours*

One lecture and demonstration lab, one lab. Preparation of plant & animal tissue for sectioning. Techniques of embedding, sectioning, staining and mounting. Photography through the microscope. Film and

print processing. Theory of the light microscope and brief introduction to electron microscopy. Fall. Mr. Côté.
*Prerequisites*: WPE 486 or WPE 388, & organic chemistry.

### 588. COMMERCIAL TIMBERS OF THE WORLD

*3 credit hours*

One hour of lecture, one hour of conference, three hours of lab, and assigned reading. Important commerical timbers of the world, their structure, physical properties, identification, supply and uses. Spring. Mr. deZeeuw.
*Prerequisite*: WPE 388.

### 702. ELASTICITY OF WOOD AND PLYWOOD

*3 credit hours*

Theory of elasticity as applied to solid and laminated wood, sandwich material, and plywood. Elements of wood plasticity. Spring. Mr. Davidson.
*Prerequisites*: WPE 502, Physics 203, & Physics 204.

### 796. ADVANCED TOPICS

*2 or 3 credit hours*

Lectures, conferences, discussions, and lab. Advanced topics in wood products engineering, including advanced studies in one or more of the basic areas covered in other courses in wood products engineering. Fall or Spring. Staff.
*Prerequisite*: Consent of instructor.

### 797. WOOD PRODUCTS ENGINEERING SEMINAR

*2 or 3 credit hours*

Conference, discussion and reports analyzing current research and new developments, new literature and subject matter surveys in wood products engineering. Fall & Spring. Mr. Anderson & Staff.

### 798. RESEARCH IN WOOD PRODUCTS ENGINEERING

*Credit hours arranged according to nature of problem*

Investigations on directed study in wood products engineering including manufacturing, marketing, anatomy, physics, quality and mechanical properties of wood. One typewritten report (original and one carbon) required. Fall & Spring. Staff.

### 800. RHEOLOGY OF WOOD AND POLYMERS

*3 credit hours*

Three hours of lecture. General principles of mechanical behavior with applications to wood and polymer systems. Fall. Mr. Pentoney.
*Prerequisites*: Chem 346 & 356, Math 585, Physics 104 or Physics 106 or equivalent.

### 860. ADVANCED WOOD PHYSICS

*3 credit hours*

Three hours of lecture. The physics of wood and wood-base materials. Treatment of wood-moisture relations with emphasis on movement of liquids and heat through wood. Derivation of the diffusion equations and their application to wood-treating and wood-drying processes. Spring. Mr. Skaar.
*Prerequisites*: WPE 566, Math 585.

### 880. INTERPRETATION OF CELLULAR ULTRASTRUCTURE

*2 credit hours*

One hour of lecture, two hours of demonstration and discussion. The organization and sculpturing of the walls of plant cells; the cellulose microfibril, matrix and incrusting substances, and the warty layer. The ultrastructure and general function of cytoplasmic organelles in cells. The tools and techniques used for light and electron microscopic study of cells, and the interpretation of structural evidence. Directed study and discussion of the latest (current) literature on pertinent topics. Spring. Mr. Côté.
*Prerequisites:* Permission of the instructor.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## FOREST ZOOLOGY*

### 100. GENERAL ZOOLOGY

*4 credit hours*

Prerequisite to all other courses in Forest Zoology. Three hours of lecture and recitation, three hours of lab. A general study of the animal organism, its development, structure, and function; and a survey of selected phyla with emphasis on the principles of taxonomy, distribution, genetics, evolution, and the role of animals in the forest. Spring. Mr. Chambers.

### 200. WILDLIFE CONSERVATION

*3 credit hours*

Two hours of lecture, one hour of recitation. Introduction to the biological principles of conservation including the relationship of natural resources to modern society. The wildlife resource and its conservation will be emphasized. It is not open to students majoring in Forest Wildlife Management. Fall. Mr. Payne.

*Prerequisite*: One semester of biological science.

### 350. PRINCIPLES OF WILDLIFE MANAGEMENT

*3 credit hours*

Two hours of lecture, three hours of lab. A study of the principles governing management of forest and range wildlife and of the biological-economic-sociological mechanism involved. Spring.

*Prerequisite*: F Biol 320, or permission of instructor.

### 385. VERTEBRATE ANATOMY

*4 credit hours*

Three hours of lecture and recitation, three hours of lab. Comparative study of the anatomy of representative vertebrates, emphasizing structural, functional and developmental characteristics at both macro- and micro-levels. Fall. Mr. Graves

### 511. INVERTEBRATE ZOOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Structure, classification, and probable descent of invertebrate animals. Emphasis on their relationships to the forest community. Spring. Mr. Dindal.

### 512. VERTEBRATE TAXONOMY

*3 credit hours*

Two hours of lecture, three hours of lab. Identification and classification of vertebrates of the forest community. Emphasis on the use of keys and recognition and significance of distinguishing characters. Spring. Mr. Alexander.

### 516. ICHTHYOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. An introduction to the anatomy, physiology, ecology, behavior and taxonomy of fishes. Spring.

### 520. TERRESTRIAL ANIMAL ECOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Relations of terrestrial animals to their physical, chemical and biological environment. Emphasis on community principles, succession, and terrestrial adaptations. Fall. Mr. Dindal.

*Prerequisite*: A course in ecology.

### 523. INVERTEBRATE ECOLOGY

*2 credit hours*

Note: SUNY, Albany No. BIO 423

Two full days/week for four weeks. Study of terrestrial invertebrate micro-communities; descriptive and comparative assay of microhabitats incorporating experimental and field techniques. Summer Session I, Cranberry Lake Biological Station. Mr. Dindal, College of Forestry.

*Prerequisites*: General biology, general ecology; invertebrate zoology is recommended.

### 524. VERTEBRATE ECOLOGY

*2 credit hours*

Note: SUNY, Albany No. BIO 425

Two full days/week for four weeks. Utilization of unique Adirondack forms and communities to study population dynamics, behavior, systematics and ecological role of vertebrates; standard field and laboratory techniques. Summer Session II, Cranberry

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*See also listings for Forest Biology.

Lake Biological Station. Mr. Rosenzweig, SUNYA.

*Prerequisites*: 12 hours of biology.

### 525. LIMNOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. An introduction to the ecology of inland waters. Emphasis on the lake as an aquatic habitat and the contained communities. Fall.

### 528. VERTEBRATE POPULATION ECOLOGY

*3 credit hours*

Two hours of lecture and one three-hour lab per week. Fundamental parameters of population structure and change with emphasis on vertebrate species. Fall or Spring. Mr. Chambers.

*Prerequisite*: A course in general ecology.

### 530. ANIMAL PHYSIOLOGY

*3 credit hours*

Three hours lecture. Principles of the processes of digestion, circulation, respiration, excretion, physiologic defense mechanisms, muscle contraction, electrophysiology, neural and endocrinologic regulation, and reproduction. Spring. Mr. Hartenstein.

*Prerequisite*: F Biol 330 or equivalent.

### 540. LAKE, POND AND STREAM MANAGEMENT

*2 credit hours*

One hour of lecture, three hours of lab. Principles and techniques of managing fisheries resources in fresh-water environments. Spring.

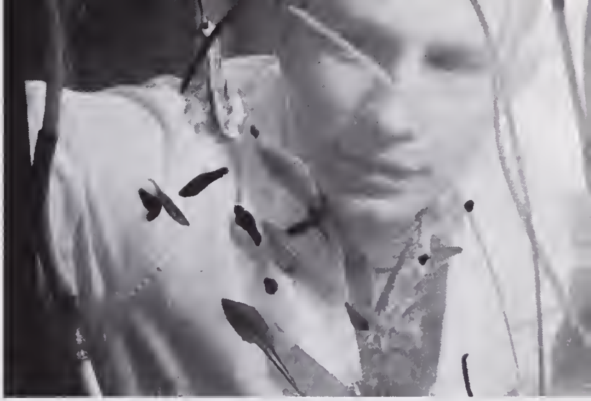
*Prerequisite*: F Zool 525.

### 550. METHODS OF WILDLIFE MANAGEMENT

*3 credit hours*

Two hour lecture, three hour lab. Field and laboratory techniques, with emphasis on demonstration and experience. One weekend trip is scheduled. Fall. Mr. Chambers.

*Prerequisite*: F Zool 350.



### 570. PRINCIPLES OF ANIMAL BEHAVIOR

*3 credit hours*

Three hours of lecture per week. A study of the basic principles of animal behavior, stressing the interplay of exogenous and endogenous control of behavior. Fall. Mr. Price.

*Prerequisite*: General Zoology.

### 580. COMPARATIVE HISTOLOGY

*3 credit hours*

Two hours lecture, three hours lab. An integrated and comparative survey of structure and function of tissues throughout the animal kingdom. Fall. Mr. Hartenstein.

*Prerequisite*: F Zool 330 or equivalent.

### 620. INVERTEBRATE SYMBIOSIS

*3 credit hours*

Two hours of lecture and one three-hour lab. An introduction to the ecology and evolution of interspecific relationships of invertebrates. Spring, even years. Mr. Dindal.

*Prerequisites*: F Bio 320, F Zool 511.

### 630. COMPARATIVE ENDOCRINOLOGY

*3 credit hours*

Three hours lecture. General endocrinology with emphasis on the comparative functions of endocrine glands of animals. Spring. Mr. Graves.

*Prerequisite*: F Zool 530 or equivalent.

### 670. VERTEBRATE BEHAVIOR

*3 credit hours*

Two hours lecture, three hours lab. Lecture, discussion and experimentation on the behavior of vertebrates, with emphasis on behavioral development, learning, orientation, and social behavior. Spring. Mr. Price.

*Prerequisites*: F Zool 570.

### 700. FOREST ZOOLOGY TRIP

*2 credit hours*

A 7 to 10 day trip to (1) agencies engaged in zoological research, management, and administration, or (2) regions or areas of unusual biological interest. A final report is required. Estimated student expense, $75.00. Fall or Spring. Staff.

*Prerequisite*: Instructor's permission.

### 725. ZOOGEOGRAPHY OF NORTH AMERICA

*3 credit hours*

Two hours of lecture, three hours of lab. Geographic distribution of North American vertebrates, factors determining their distribution and nature of range occupied. Fall. Mr. Alexander.

### 750. ADVANCED WILDLIFE MANAGEMENT

*3 credit hours*

Two hours lecture, three hours lab. Advanced wildlife management with emphasis on regional and administrative wildlife problems. Extended trips (two weekend trips) are required. Fall.

*Prerequisite*: F Zool 550 or permission of the instructor.

### 797. FOREST ZOOLOGY SEMINAR

*1 credit hour*

Two hours of discussion and assigned reports on current problems and new developments in forest zoology. Fall and/or Spring. Staff.

### 798. PROBLEMS IN FOREST ZOOLOGY

*Credit arranged according to nature of problem*

Hours to be arranged. Individual study of special problems in forest zoology. One typewritten report (original and one carbon) required. Fall or Spring. Staff.

### 830. HOMEOSTASIS

*3 credit hours*

Two hours lecture, one hour discussion. An examination of the cellular, neural, and hormonal mechanisms and interactions whereby animals adapt physiologically to departures from steady-state conditions in their environment and life-history. Fall. Alternate years beginning 1969. Mr. Hartenstein.

*Prerequisites*: F Zool 630.

### 835. INVERTEBRATE PHYSIOLOGY

*3 credit hours*

Two hours lecture, three hours lab. A study of the physiologic mechanisms employed by invertebrates other than insects in coping with the exigencies of their environment. Fall or Spring. Alternate years. Mr. Hartenstein.

*Prerequisites*: F Zool 511 and F Zool 530.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 930. TOPICS IN VERTEBRATE ENDOCRINOLOGY

*2 credit hours*

Two hours lecture. A discussion of the current status of vertebrate endocrinology research. Spring. Mr. Graves.

*Prerequisites*: Graduate standing and F Zool 630 or equivalent.

### 950. TOPICS IN WILDLIFE BIOLOGY

*1 to 3 credit hours*

Hours to be arranged. Group study of a wildlife management topic. Fall or Spring. Mr. Chambers.

*Prerequisites*: Six credits of wildlife management courses.

### 970. TOPICS IN ANIMAL BEHAVIOR

*2 credit hours*

Two hours lecture and discussion. A seminar-type course designed to explore in depth selected and controversial subject areas in animal behavior. Fall or Spring. Mr. Price.

*Prerequisite*: F Zool 670 or equivalent.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

# X

# THE COLLEGE FACULTY

The date in parenthesis after each name denotes the first year of service, two or more dates, the term of service.

## FACULTY EMERITUS

George J. Albrecht (1946–1968)
*Professor of Landscape Architecture; Director of School of Landscape Architecture*
B.S., New York State College of Forestry, 1930

Lawrence J. Belanger (1947–1965)
*Professor of Accounting; Registrar*
B.S., Syracuse University, 1932; M.S. New York State College for Teachers, Albany, 1941

Harold C. Belyea (1917–1956)
*Professor of Forest Management*
B.A., University of Mount Allison, 1908; M.A., 1911; B.Sc.F., University of New Brunswick, 1911; M.F., Yale University, 1916

Nelson C. Brown (1912–1917, 1921–1951)
*Professor of Forest Utilization*
A.B., Yale University, 1906; M.F., 1908

Floyd E. Carlson (1930–1969)
*Professor, Public Service and Continuing Education*
B.S.F., University of Washington, 1928; M.F., 1930

Raymond F. Crossman (1942–1968)
*Professor of English; Dean of Students*
A.B., Syracuse University, 1926; M.A., 1931

James E. Davis (1947–1965)
*Professor of Forestry*
B.S., Cornell University, 1924; M.F., 1926

Carlyn C. Delavan (1923–1957)
*Professor of Forest Engineering*
A.B., University of Michigan, 1914; M.S.F., 1915

Wilford A. Dence (1920–1961)
*Professor of Forest Zoology*
B.S., New York State College of Forestry, 1920

James F. Dubuar (1919–1957)
*Director of Ranger School; Professor of Forestry*
A.B., University of Michigan, 1913; M.S.F., 1915

Carl C. Forsaith (1917–1959)
*Professor of Wood Technology*
B.A., Dartmouth College, 1913; M.A., Harvard University, 1914; Ph.D., 1917

Clifford H. Foster (1927–1959)
*Professor of Forestry*
B.S., New York State College of Forestry, 1921; M.F., 1922; M.S., Harvard University, 1924

George H. Haines (1953–1968)
*Director of Business Affairs*
B.S., University of Rhode Island, 1932

William M. Harlow (1928–1965)
*Professor of Wood Technology*
B.S., New York State College of Forestry, 1925; M.S., 1926; Ph.D., 1928

Ray R. Hirt (1921–1959)
*Senior Professor of Forest Botany*
B.S., Hamline University, 1917; M.S., New York State College of Forestry, 1924; Ph.D., 1928

Raymond J. Hoyle (1918–1957)
*Professor of Forest Utilization*
B.S., New York State College of Forestry, 1917; M.S., Syracuse University, 1930

Ralph T. King (1937–1965)
*Professor of Forest Zoology*
B.S., Utah State Agricultural College, 1924; M.S., 1925

Orrin L. Latham (1930–1966)
*Associate Professor of Forestry*
B.S.F., Iowa State College, 1927; M.F., Yale University, 1932

Clyde Leavitt (1932–1943)
*Assistant Dean*
B.A., University of Michigan, 1901; M.S.F., 1904

Aubrey H. MacAndrews (1926–1962)
*Professor of Forest Entomology*
Truro Agriculture College, 1923; B.S., New York State College of Forestry, 1925; M.S., 1926

Henry F. A. Meier (1912–1914), (1929–1946)
*Professor of Forest Botany*
B.A., Indiana University, 1912; M.A., 1913; Ph.D., Columbia University, 1920

Lucian P. Plumley (1936–1967)
*Director of Ranger School; Professor of Forestry*
New York State Ranger School, 1931; B.S., New York State College of Forestry, 1935

John C. Sammi (1929–1967)
*Professor of Forest Management*
B.S., University of California, 1922; M.F., New York State College of Forestry, 1931

Hardy L. Shirley (1945–1967)
*Professor of Forestry; Dean*
B.A., Indiana University, 1922; Ph.D., Yale University, 1928; D.h.c., University of Helsinki, 1958; D.Sc., Syracuse University, 1966

LeRoy C. Stegeman (1929–1965)
*Professor of Forest Zoology*
B.S., Michigan State College, 1928; M.S., University of Michigan, 1929

Ralph G. Unger (1937–1964)
*Professor of Forest Extension*
B.S., New York State College of Forestry, 1930

Walter L. Welch (1950–1965)
*Associate Professor of Landscape Architecture*
A.B., Syracuse University, 1946

Harold G. Wilm (1953–1966)
*Professor of Forest Influences; Associate Dean*
B.S., Colorado College, 1929; M.F., Cornell University, 1930; Ph.D., 1932

Louis E. Wise (1919–1932)
*Professor of Forest Chemistry*
B.A., Columbia University, 1907; Ph.D., 1911

## COLLEGE FACULTY

Roger F. Adams (1969)
*Research Associate, Polymer Chemistry*
B. Sc., Sheffield University, 1965; Ph.D. 1968

Maurice M. Alexander (1949)
*Professor of Forest Zoology; Chairman of Department*
B.S., New York State College of Forestry, 1940; M.S., University of Connecticut, 1942; Ph.D., State University of New York College of Forestry, 1950

Douglas C. Allen (1968)
*Assistant Professor of Forest Entomology*
B.S., University of Maine, 1962; M.S., 1965; Ph.D., University of Michigan, 1968

David G. Anderson (1959)
*Assistant Dean for Administration; Associate Professor of Forestry*
New York State Ranger School, 1950; B.S., State University College of Forestry at Syracuse University, 1953; M.S., University of Utah, 1958

Eric A. Anderson (1950)
*Professor of Wood Products Engineering; Chairman of Department*
B.S.F., University of Washington, 1932; Ph.D., State University College of Forestry at Syracuse University, 1949

George R. Armstrong (1950)
*Professor of Forestry Economics*
B.S., State University of New York College of Forestry, 1949; M.S., 1959; Ph.D., 1965

JAMES P. BAMBACHT (1967)
*Instructor, Paper Science and Engineering*
A.B., Kalamazoo College, 1954; M.S., The Institute of Paper Chemistry, 1956

ROBERT H. BAUM (1964)
*Research Associate; Assistant Professor, Biochemistry Research*
B.S., Cornell University, 1957; Ph.D., University of Illinois, 1962

DONALD F. BEHREND (1960–1967, 1968)
*Research Associate, Director of Huntington Forest Wildlife Research*
B.S., University of Connecticut, 1958; M.S., 1960; Ph.D., State University College of Forestry at Syracuse University, 1966

JOHN D. BENNETT (1960)
*Associate Professor of Forestry Economics*
B.A., Ohio Wesleyan University, 1954

JOHN V. BERGLUND (1965)
*Assistant Professor of Silviculture*
B.S., Pennsylvania State University, 1962; M.S., 1964; Ph.D., State University College of Forestry at Syracuse University, 1968

C. ALLEN BICKFORD (1963)[1]
*Professor of Statistics*
B.S., Dartmouth College, 1925; M.S., University of Idaho, 1931

ALFRED H. BISHOP (1942)
*Associate Public Service Officer (STS Project); Associate Professor, Public Service and Continuing Education*
New York State Ranger School, 1925; B.S., New York State College of Forestry, 1929; M.F., 1931

PETER E. BLACK (1965)
*Associate Professor of Silviculture*
B.S., University of Michigan, 1956; M.F., 1958; Ph.D., Colorado State University, 1961

JOHANNA E. BOWEN (1968)
*Assistant Librarian*
B.A., University of Illinois, 1965; M.L.S., 1966

WILLIAM W. BRACKE (1967)
*Research Associate; Assistant Professor, Polymer Research*
M.S., University of Louvain, 1963; Ph.D., 1965

JEROME BREZNER (1961)
*Associate Professor of Forest Entomology*
A.B., University of Rochester, 1952; A.M. University of Missouri, 1956; Ph.D., 1969

ROBERT H. BROCK, JR. (1967)
*Associate Professor of Photogrammetry*
B.S., State University College of Forestry at Syracuse University, 1958; M.S., 1959

RANIER H. BROCKE (1969)
*Research Associate, Forest Zoology*
B.S., Michigan State University, 1955; M.S., 1957

EBERHARD F. BRUNIG (1968)
*Visiting Associate Professor of World Forestry*
Diplomforstwirt, University of Goettingen, Hann.–Munden, 1952; Doctorate in Forestry, 1953

HARRY W. BURRY (1962)
*Associate Public Service Officer (Wood Utilization Specialist); Associate Professor Public Service and Continuing Education*
B.S., New York State College of Forestry, 1941; M.F., State University College of Forestry at Syracuse University, 1964

DIANNE M. CAPRITTA (1967)
*Assistant Librarian*
B.S., University of Illinois, 1965; M.L.S., Syracuse University, 1967

ROBERT E. CHAMBERS (1967)
*Assistant Professor of Forest Zoology*
B.S., Pennsylvania State University, 1954; M.S., 1956; Ph.D., Ohio State University, 1967

NEILS B. CHRISTIANSEN (1960)
*Associate Professor of Forestry Economics*
B.S., University of Idaho, 1957; M.S., State University College of Forestry at Syracuse University, 1959; Ph.D., 1966

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[1] Sabbatic Leave 2/1/70–7/31/70

ROLLA W. COCHRAN (1964)
*Public Relations Officer; Associate Professor, Public Service and Continuing Education*
B.A., Denison University, 1949; M.S. Ohio State University, 1951

JACK B. CODY (1968)
*Research Associate; Project Leader, Applied Forestry Research Institute*
B.S., University of Michigan, 1954; M.F., 1963

WILFRED A. CÔTÉ, JR. (1950)
*Professor of Wood Technology; Director of Ultrastructure Study Services*
B.S., University of Maine, 1949; M.F., Duke University, 1950; Ph.D., State University College of Forestry at Syracuse University, 1958

PHILLIP J. CRAUL (1968)
*Research Associate; Assistant Professor, Silviculture Research*
B.S.F., Pennsylvania State University, 1954; M.S., 1960; Ph.D., 1964

TIBERIUS CUNIA (1968)
*Professor of Forest Mensuration*
Forest Engineer, Ecole Nat. des Eaux et Forets, 1951; M.S., McGill University, 1957

SEYMOUR CUNNINGHAM (1968)
*Research Associate, Forest Management*
B.S., University of Maine, 1962

GEORGE W. CURRY (1966)
*Assistant Professor of Landscape Architecture*
B.A., Michigan State University, 1962; B.S., 1965; M.L.A., University of Illinois, 1967

ROBERT W. DAVIDSON (1957)
*Professor of Wood Products Engineering*
B.S., Montana State University, 1948; M.S., State University College of Forestry at Syracuse University, 1956; Ph.D., 1960

RUSSELL C. DECKERT (1952)
*Associate Public Service Officer (Wood Utilization Specialist); Associate Professor, Public Service and Continuing Education*
B.S.F., University of Georgia, 1938; M.F., Duke University, 1943

CARLTON W. DENCE (1951)
*Research Associate; Associate Professor, Pulp and Paper Research*
B.S., Syracuse University, 1947; M.S., State University of New York College of Forestry, 1949; Ph.D., State University College of Forestry at Syracuse University, 1959

CARL H. DEZEEUW (1946)
*Professor of Wood Products Engineering*
A.B., Michigan State College, 1934; B.S., 1937; M.S., New York State College of Forestry, 1939; Ph.D., State University of New York College of Forestry, 1949

DANIEL L. DINDAL (1966)
*Assistant Professor of Forest Zoology*
B.S., Ohio State University, 1958; M.A., 1961; Ph.D., 1966

WILLIAM A. DUERR (1952)
*Professor of Forestry Economics; Chairman of Department*
B.S., Iowa State College, 1934; M.S., University of Minnesota, 1939; A.M., Harvard University, 1941; Ph.D., 1944

GEORGE F. EARLE (1952)
*Professor of Art*
B.F.A., Syracuse University, 1937; M.F.A., Yale University, 1946

HERBERT E. ECHELBERGER (1966)
*Adjunct Assistant Professor, Forest Management*
B.S., Southern Illinois University, 1965; M.S., 1966

JOHN H. ENGELKEN (1959)
*Forest Manager, Svend Oluf Heiberg Memorial Forest; Assistant Professor of Forestry*
B.S.F., Utah State University, 1950

ARTHUR R. ESCHNER (1961)
*Associate Professor of Forest Influences*
B.S., State University of New York College of Forestry, 1950; M.S., Iowa State College, 1952; Ph.D., State University College of Forestry at Syracuse University, 1965

C. Eugene Farnsworth (1930)
*Professor of Silviculture; Chairman of Department*
B.S.F., Iowa State College, 1926; M.F., Yale University, 1928; Ph.D., University of Michigan, 1945

Claude C. Freeman (1959)
*Assistant Professor of Landscape Architecture*
B.S., State University College of Forestry at Syracuse University, 1959

William J. French (1967)
*Instructor of Forest Botany*
B.S., University of Miami, 1957; M.S., University of Idaho, 1959; Ph.D., State University College of Forestry at Syracuse University, 1967

William J. Gabriel (1968)
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State University at Albany
State University at Binghamton
State University at Buffalo
State University at Stony Brook

## MEDICAL CENTERS

Downstate Medical Center at Brooklyn
Upstate Medical Center at Syracuse

## COLLEGES OF ARTS AND SCIENCE

College at Brockport
College at Buffalo
College at Cortland
College at Fredonia
College at Geneseo
College at New Paltz
*College at Old Westbury
College at Oneonta
College at Oswego
College at Plattsburgh
College at Potsdam

*Three additional Colleges of Arts and Science are in varying stages of development. Two four-year campuses, in Westchester County at Purchase and in Nassau County at Old Westbury, are under construction. Old Westbury admitted its first students in limited numbers at temporary quarters in Oyster Bay in September, 1968. The third campus will be upper-division (junior-senior years) in concept and located in the Utica-Rome-Herkimer area. Master's level programs will be offered at all three campuses.

## SPECIALIZED COLLEGES

College of Forestry at Syracuse University
Maritime College at Fort Schuyler (Bronx)

## AGRICULTURAL AND TECHNICAL COLLEGES (Two-Year)

Alfred
Canton
Cobleskill
Delhi
Farmingdale
Morrisville

## STATUTORY COLLEGES

College of Ceramics at Alfred University
College of Agriculture at Cornell University
College of Home Economics at Cornell University
School of Industrial and Labor Relations at Cornell
Veterinary College at Cornell University

## COMMUNITY COLLEGES

(Locally-sponsored, two-year colleges under the program of State University)

Adirondack Community College at Glens Falls
Auburn Community College at Auburn
Borough of Manhattan Community College
Bronx Community College
Broome Technical Community College at Binghamton
Community College of the Finger Lakes at Canandaigua
Corning Community College at Corning
Dutchess Community College at Poughkeepsie
Erie County Technical Institute at Buffalo
Fashion Institute of Technology at New York City
Fulton-Montgomery Community College at Johnstown
Genesee Community College at Batavia
Herkimer County Community College at Ilion
Hudson Valley Community College at Troy
Jamestown Community College at Jamestown
Jefferson Community College at Watertown
Kingsborough Community College
Mohawk Valley Community College at Utica
Monroe Community College at Rochester
Nassau Community College at Garden City
New York City Community College of Applied Arts and Sciences
Niagara County Community College at Niagara Falls
North Country Community College at Saranac Lake
Onondaga Community College at Syracuse
Orange County Community College at Middletown
Queensborough Community College
Rockland Community College at Suffern
Staten Island Community College
Suffolk County Community College at Selden
Sullivan County Community College at South Fallsburg
Tompkins-Cortland Community College at Groton
Ulster County Community College at Stone Ridge
Westchester Community College at Valhalla

(Five additional community colleges have been approved by the Board of Trustees and are in varying stages of development. They are sponsored by Clinton, Columbia-Greene and Schenectady Counties and two by the New York City Board of Higher Education.)

STATE UNIVERSITY OF NEW YORK
LET EACH BECOME ALL HE IS CAPABLE OF BEING
1948

Cassetta

# COLLEGE OF FORESTRY CATALOG

# 1970-1971

# STATE UNIVERSITY OF NEW YORK

# STATE UNIVERSITY OF NEW YORK

The State University of New York, established by the State Legislature in 1948, comprises 70 colleges and centers. At present, 63 conduct classes: four University Centers, two Medical Centers, 11 Colleges of Arts and Science, two Specialized Colleges, six two-year Agricultural and Technical Colleges, five Statutory Colleges, and 33 locally-sponsored, two-year Community Colleges.

Three Colleges of Arts and Science are in varying stages of development. Two four-year campuses, in Westchester County at Purchase and in Nassau County at Old Westbury, are under construction. Old Westbury admitted a limited number of students in September, 1968, in temporary quarters at Oyster Bay, Long Island. The third campus will be upper-divisional (junior-senior years) in concept and located in the Utica-Rome-Herkimer area. Master's level programs will be offered at all three campuses.

The University's Trustees also have approved the establishment of five additional Community Colleges. In varying stages of development, they are sponsored by Clinton, Columbia-Greene, and Schenectady Counties and two by New York City's Board of Higher Education.

The University further comprises the Ranger School, a division of the College of Forestry, which offers a 43-week technical forestry program at Wanakena; the Center for International Studies and World Affairs at Albany; and four Urban Centers administered by Community Colleges.

University-wide research programs include the Atmospheric Sciences Research Center with campus headquarters at Albany, the Institute for Theoretical Physics and the Marine Sciences Research Center at Stony Brook, and the Water Resources and Polymer Research Centers at the College of Forestry. Two research facilities headquartered at State University of New York at Buffalo are the Western New York Nuclear Research Center and the Center for Immunology.

Graduate study at the doctoral level is offered by State University at 12 of its campuses, and graduate work at the master's level at 22. The University is continuing to broaden and expand over-all opportunities for advance degree study.

Graduate study areas embrace a wide spectrum including agriculture, business administration, criminal justice, dentistry, education, engineering, forestry, law, liberal arts and science, library science, medicine, nursing, pharmacy, social work, and veterinary medicine.

Four-year programs strongly emphasize the liberal arts and science and also include specializations in teacher education, business, radio and television, forestry, maritime service, ceramics, pre-law, and the fine and performing arts.

Two-year programs include nursing and liberal arts transfer programs and a wide variety of technical curriculums such as agriculture, business, and the industrial and medical technologies.

The University's Urban Centers provide training for skilled and semi-skilled occupations and college foundations courses for youths in the inner city areas.

Governed by a Board of Trustees appointed by the Governor, State University of New York comprises all State-supported institutions of higher education, with the exception of the senior colleges of City University of New York. Each college and center of State University is locally administered. Although separated geographically, all are united in the purpose of improving and extending numerous opportunities to the youth of New York State.

The State University motto is "Let Each Become All He Is Capable of Being."

## ACCREDITATION

STATE UNIVERSITY OF NEW YORK is accredited by the Middle States Association of Colleges and Secondary Schools. The College of Forestry is also accredited by the Society of American Foresters. The School of Landscape Architecture is accredited by the national professional organization, The American Society of Landscape Architects.

# 1970-1971
# GENERAL CATALOG

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STATE UNIVERSITY
COLLEGE OF FORESTRY
AT SYRACUSE UNIVERSITY

# STATE UNIVERSITY OF NEW YORK

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# COLLEGE OF FORESTRY

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# ACADEMIC CALENDAR

## *First Semester, 1970–71*

| | |
|---|---|
| Dormitories Open | September 13 (8 a.m.) |
| Registration | September 14–16 |
| Classes Begin | September 17 (8 a.m.) |
| Middle of Term | November 14 |
| Thanksgiving Weekend | November 25 (12 m.)–November 30 (8 a.m.) |
| Christmas Recess | December 19 (12 m.)–January 4 (8 a.m.) |
| Last Day of Classes | January 16 |
| Final Examinations | January 18–27 |

## *Second Semester, 1970–71*

| | |
|---|---|
| Registration | February 1–3 |
| Classes Begin | February 4 |
| Middle of Term | April 3 |
| Spring Recess | April 2 (12 m.)–April 13 (8 a.m.) |
| Last Day of Classes | May 22 |
| Final Examinations | May 24–June 2 |
| Commencement | June 5 |

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## I

## THE COLLEGE GOALS

One-third of the land area of the United States is forested, and in many other countries, especially those just now developing industrial societies, the percentage is much higher. Efficient and wise use of forests, and related natural resources, requires an ever-growing number of scientists, engineers, managers and planners sensitive to social needs. The development, manufacture, and use of forest products and materials continue to accelerate in today's expanding technology. Creating a functional, pleasing, livable environment for man becomes increasingly important as population pressures build. It is a College goal to educate students in a wide spectrum of disciplines to fill professional positions in these fields, and to instill in these graduates a knowledge of their role and application in human affairs.

Research, the seeking of new facts, is a corollary of education, and is another major College goal. Research is a vital scholarly activity of the faculty, and helps provide a strong teaching base for undergraduate as well as graduate students.

Public service, the third major goal, has a history as old as the College itself. Using the same broad concept of forestry as is found in the classrooms, public education efforts range from the individual to mass audiences.

To accomplish these goals the College seeks capable, dedicated students who desire to acquire knowledge and to use this knowledge to assume responsible and creative positions in society.

It seeks to improve the environment for learning and research by providing modern, well-equipped classrooms, laboratories, and library facilities. It continually seeks to enhance the already distinguished faculty and supporting staff. It seeks to improve curriculums to meet changing science, engineering and social requirements.

The College strives to find more effective ways to reach the public, in order to be of greater service to individuals, industries, and all levels of government. And it strives to continue its role of leadership in natural resources higher education.

## II

# COLLEGE PROGRAMS AND FACILITIES

The College of Forestry was founded as a State College in 1911, and became a unit of the State University of New York when it was created by the Legislature in 1948. The central administrative offices of State University are in Albany. The President is the chief executive officer of the College, and is governed by policies established by the College of Forestry Trustees and the State University Trustees. Because of the cooperative relationship with Syracuse University, a close liaison is maintained with the Chancellor and other administrative officers.

### ENVIRONMENT

The campus of the College adjoins that of Syracuse University on one of the hills which surround and overlook metropolitan Syracuse. The city, near the geographical center of New York, is the core of an urban and industrial region of nearly 450,000 population. Numerous manufacturing firms apply modern technology in electrical, chemical, mechanical, metallurgical, and biological fields. Major highways and rail, air, and bus lines, intersect at Syracuse.

Both the City of Syracuse and Syracuse University offer varied cultural and recreational opportunities, including exhibitions of paintings and sculpture, recitals and concerts, amateur and professional theater, dance and cinema, lectures in the humanities, forums and addresses by political and social scientists. The annual Arts Festival is among the special attractions of the campus.

Among the city's cultural assets are the Syracuse Symphony Orchestra and the Everson Museum of Arts of Syracuse and Onondaga County, both with a fine philosophy of community service and participation.

Recreation opportunities are varied because of the central New York climate and geography. General facilities for winter and summer sports are enjoyed by residents and students. The City of Syracuse and Onondaga County have extensive park systems, and State Parks are nearby. The Finger Lakes Region begins 18 miles away, and the Thousand Islands are 90 miles from Syracuse. The Adirondack and Catskill Mountain Parks and Niagara Falls are within 150 miles.

### CAMPUS

Bray Hall, Marshall Memorial Building, Baker Memorial Wood Products Laboratory, Illick Hall, Moon Memorial Library, and the new Walters Hall are the principal buildings.

Off-campus facilities include nearly 22,000 acres of forest land at six locations used for instruction, demonstration, and research. A tree nursery and small arboretum are included in the total. At the Huntington Wildlife Forest Station in the Central Adirondack Mountains, a Forest Wildlife Research Laboratory is in final planning stages. The Cranberry Lake Experimental Forest is the site of Cranberry Lake Biology Station where a summer session in environmental biology is conducted along with forest and environmental research. A complete sawmill operation is carried out at the Pack Demonstration Forest, near Warrensburg.

On the campus are the following institutes and centers: Cellulose Research Institute, Empire State Paper Research Institute, State University Polymer Research Institute, State University Water Resources Center, Office of International Forestry, and the Applied Forestry Research Institute. A work center of the U. S. Forest Service and the Roosevelt Wildlife Experiment Station are also at the College.

The College is extensively furnished with modern equipment and instruments for instruction and research in its major subject areas. These include electron microscopes, plant growth chambers, air conditioned greenhouses, an animal environmental simulating chamber, a bio-acoustical laboratory, a 1,000-curie cobalt-60 radiation source, radioisotopes laboratories, computer center, and specialized instrumentation including nuclear magnetic resonance, electron spin resonance, mass spectrometer, ultracentrifuge, x-ray and infra-red spectrophotometer. Photogrammetric and geodetic facilities include one of the most extensive arrays of equipment in the U. S., with a Nistri TA-3 stereocomparator, Mann comparator, computerized Nistri photocartograph, and nine other varieties of plotters. The paper science and engineering laboratory has a semi-commercial paper mill with accessory equipment. The greenhouses and forest insectary are

used to produce plant and insect material for classroom and laboratory. Extensive collections are available for study, including wood samples from all over the world, botanical materials, insects, birds, mammals, and fishes.

## PROFESSIONAL EDUCATION

The College provides instruction for professional work in seven, four-year curriculums, some of which contain optional programs. Each leads to the Bachelor of Science degree. In the case of one, a fifth year leads to the Bachelor of Landscape Architecture degree. Most undergraduates enter at the freshman level, but the number of transfer students entering at the sophomore and junior levels is increasing.

Graduate study, leading to the Master's degree and Doctor of Philosophy degree, began when the College was founded. The first advanced degree was awarded in 1913. Since then graduate enrollment has increased steadily and averages 20 per cent of the registration. More than 1,000 advanced degrees have been awarded by the College. Graduate students choose among many fields of forestry, forest products, and their supporting science disciplines for their work toward a degree. Each year the College awards a number of scholarships, fellowships, and assistantships to degree candidates. (See page 69 for Graduate Study.)

## TECHNICAL EDUCATION

The College has been training men for technical forestry work since 1912 at the Ranger School at Wanakena, N. Y. It is situated on 2,680 acres on Cranberry Lake in the Adirondack Mountains. The school offers a terminal one-year course

which prepares men for a variety of technical forestry jobs. Additional information can be obtained from the Director, New York State Ranger School, Wanakena, N.Y.

## PUBLIC EDUCATION

The College serves the public through its Office of Public Service and Continuing Education with public education a responsibility of all faculty members. The Office coordinates efforts to provide information, advice and guidance to specialized local, state and federal agencies, to the forest and wood-using industries, and to the general public on matters relating to the conservation and use of New York's forest resources.

Continuing education programs are designed to serve needs in three broad areas: refresher programs to up-date professionals at various levels of responsibility; more comprehensive programs of an interdisciplinary nature to improve decision-making premises for resource managerial and supervisory personnel; and informational programs aimed at better recognition of basic relationships and impacts between land, resources, and society, for lay and community leaders involved in planning and stewardship.

Various media and programs are used for off-campus public service endeavors. These include a Wood Utilization Team for wood-using industries, a motion-picture film library with supporting production facilities, and a wide range of publications, both technical and popular, on forestry topics.

In addition, mass communications techniques are used to reach the public with certain types of information, including radio and television, exhibits, a speakers' bureau, tours, newspapers, magazines, and trade journals.

Requests for public education services should be sent to: Director, Office of Public Service and Continuing Education, College of Forestry, Syracuse, N. Y. 13210.

## RESEARCH

Research is one of the prime endeavors of the College, and is of greatest interest to entering graduate students. But the seeking of new knowledge contributes to the academic enterprise throughout the College. Instruction, public education and research are mutually beneficial at a professional institution, and it has been through these channels that the College has achieved its well-rounded and balanced program.

## STUDENTS AND FACULTY

Education in the classroom, laboratory, and field is a cooperative endeavor between students and faculty, and is an enriching experience for both. This two-way communication is traditional at the College, so much so that Deans and Department Chairmen, with considerable administrative responsibilities,

still meet classes and consider it a privilege to do so.

Men and women are accepted as students at the College, and at present number 1,492. Of these 1,189 are undergraduates and 279 are graduate students. In addition there are 24 post doctorates. A growing number of students at the College transfer here from community colleges and other institutions. Transfers can be effected in February as well as September. International students, both undergraduate and graduate, are encouraged to apply for admission. For detailed information on procedures refer to How To Apply For Admission on page 32, and Graduate Study on page 69.

The teaching and research staff of the College is comprised of 162 faculty. Selected professors are designed as graduate faculty, but they also teach undergraduate courses and are available for undergraduate consultations. Many of them serve as advisors to undergraduates which is particularly helpful to students seeking advanced degrees.

## LIBRARY

The F. Franklin Moon Memorial Library contains more than 83,000 catalogued books and pamphlets, and receives more than 640 current journals and society publications. Besides containing one of the three largest collections in the U. S. in the field of forestry, the Library is now developing strong holdings in the fields of pulp and paper technology, the basic biological sciences, polymers, and landscape architecture. Through the Robin Hood Collection the Library offers a carefully selected and broad choice of non-professional reading of general interest.

The Library subscribes to the usual abstracting and indexing services to be found in most scientific libraries as well as to services peculiar to the specializations of the College.

Interlibrary loan privileges with institutions throughout the U.S. and Canada are extended to qualified researchers. Accessible to faculty and students are the diversified resources of the libraries of Syracuse University, the State University Upstate Medical Center, the Syracuse Public Library, and the special scientific libraries of industrial companies located in the Syracuse area.

# III

# YOU AND THE COLLEGE

How can you best prepare for a professional career and a lifetime that will last well into the 21st century? This is the question facing you, a high school graduate, as you consider a college education. While the future is full of uncertainty and challenge, you can be sure that the role of the scientist, the engineer, the manager, and the landscape architect will expand during the years ahead.

Forestry as generally understood means the wise, continuous use of forests and their products for human benefit. Managing forest resources for optimum yields of timber and wood products, plentiful supplies of water, and abundance of wildlife, natural beauty, attractive recreational environments, and other services and products is a major responsibility of foresters.

Forest products industries, including wood processing, wood products manufacturing and marketing, pulp and paper, and the cellulosic products, rank high in the nation's economy. All require many wood products engineers, marketing specialists, and pulp and paper specialists to design and direct their operations, to merchandise their products, and to conduct developmental and basic research. Broad opportunities in the synthetic fiber, film, lacquer, plastics, dissolving pulp and other cellulosic and polymer industries are available for chemists with training in wood and polymer chemistry.

Biological sciences serve a vital function to both forestry and forest products, and special curriculums have been developed at the College that recognize these relationships.

Landscape architecture is a profession that deals with the development of land areas for both aesthetic and functional purposes. In recent years it has assumed great importance in the fields of land use planning and recreation.

The demand for men and women specializing in forestry and associated resources, forest products and materials, and landscape architecture, exceeds the supply. Since you are considering the College of Forestry, we can assume that you have decided on a science oriented or environmentally oriented education. But it may be helpful to you if we briefly explain the major fields of specialization available at the College. More detailed information on undergraduate curriculum is found beginning on page 37. Information on graduate study is given in Chapter VII, beginning on page 69.

## FOREST BIOLOGY

The forest biology curriculum provides a basic education in biology, presenting and integrating modern concepts in the molecular, cellular, organismal, and environmental areas of biology. It places emphasis on forest organisms, the forest environment, and provides an orientation to forestry principles. The curriculum primarily prepares students for graduate study in biological areas basic to understanding and using renewable natural resources, such as botany, forest pathology, forest entomology, silviculture, wildlife biology, or zoology. It also qualifies students for a broad range of federal, state, and private biology positions related to natural resources including wildlife biology, insect and disease control, and environmental biology.

## FOREST CHEMISTRY

Recent developments of the science of polymer chemistry have had a profound impact on the study of forest products, for it has increased the knowledge of the chemical nature of wood, which is a mixture of natural polymers. Many fundamental problems related to life processes are also being investigated by chemists who have adequate training in the life sciences and especially in the

physiology of animals, plants, insects and micro-organisms. The chemistry department, therefore, has a Wood and Polymer Chemistry Option and a Biochemistry and Natural Products Chemistry Option. By selection of proper electives, students may be certified on graduation as having completed an American Chemical Society approved curriculum. Both options permit specializations in areas that are not generally available within the usual liberal arts program.

## FOREST ENGINEERING

The forest engineering curriculum is designed to serve those students interested in both forestry and engineering who look forward to challenging careers in the engineering and development aspects of forest resource management. Effective resource management is more and more dependent upon forest engineering for such projects as site construction and other physical development, transportation system planning, road and bridge construction, new buildings and service facilities, hydrologic structures, equipment engineering, modern electronic measurements and communications, data control and analysis, and systems and operations engineering. Combining civil or industrial engineering principles with essential forestry course work, this curriculum consists of a

four-year degree program at the College with a fifth year in engineeering at Syracuse University where an engineering degree is awarded. Graduate programs can also follow the four-year forest engineering curriculum.

### LANDSCAPE ARCHITECTURE

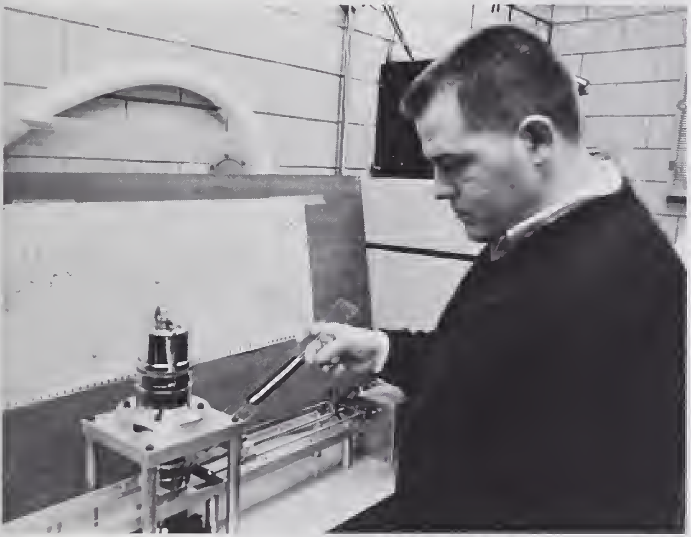
The profession of landscape architecture is expanding to meet new demands for functional and attractive outdoor environments in rural and urban areas. Site planning is a vital, integral part of recreational, industrial, commercial, public and private developments. Highway and parkway planning must answer the requirements of environmental compatibility as well as efficiency. An association with forestry is valuable for a thorough understanding of man's need to appreciate ecological relationships in his city and rural landscapes. Students must acquire a basic understanding of the multiple aspects of land resource use. The curriculum offered by the School of Landscape Architecture emphasizes design, graphics, construction, plant materials, planning and land administration.

### PAPER SCIENCE AND ENGINEERING

The pulp and paper industry is one of the major industries in our nation, and is expanding all over the world. This complex industry will require an increasing supply of highly skilled and specialized personnel, including control chemists, research chemists, production engineers, and technical service representatives. An education in paper science and engineering is related to the physical sciences, mathematics, and chemical engineering with special emphasis on their applications to the fundamental principles of pulping and papermaking. These studies involve chemistry, physics, the chemistry of pulping and bleaching, engineering principles of pulping, paper formation, drying, and finishing and the application of these sciences and principles to processing and production. Two options are offered; one a prelude to graduate study, and the other more engineering oriented.

### RESOURCES MANAGEMENT

This curriculum prepares men for professional positions as forest land managers. It provides an understanding of the principles and relationships of nature's processes, joined with an appreciation of how man's use of his resources is an integral part of his whole society and environment. Integration of the biological, engineering, technical, economic, and managerial concerns of forest land and resources use is emphasized, building upon essential understanding in general education. Resources management is recommended for students interested in professional attention to development of our land resources and natural environment, in managing lands for timber production, watershed values, wildlife and recreational uses, in forest protection, or in a wide variety of related managerial, conservation, or production activities. It is flexible enough to allow courses in several areas, including resources planning, administration, applied biology, world forestry, and conservation, and provides sound preparation for graduate study in forestry.



## WOOD PRODUCTS ENGINEERING

Technology of the wood products industries has become highly complex, providing broad opportunities for professional employment to qualified graduates. Knowledge of the structure and properties of the many commercial woods, their processing, manufacture into finished products, and new product development, as well as their distribution to the consumer, is a part of the training of a wood products engineer. Basic sciences and engineering principles are a requisite in the wood manufacturing industries, as well as the wood treatment industries.

The management of wood products industries and the marketing of wood products require the basic principles of business administration, in addition to extensive technical knowledge. Graduates of wood products engineering are in demand for industrial management and technical positions in the various product fields, such as veneer and plywood, furniture, adhesives, finishes, wood processing equipment, construction lumber, and allied industries. Three options are offered to permit flexibility in pursuing different areas within this field. Challenging careers are available in research, education, and similar technical services, both public and private. Opportunities for self-employment are numerous.

# IV

# UNDERGRADUATE STUDY

## HOW TO PREPARE FOR THE COLLEGE OF FORESTRY

Your admission to the College will be based on your academic qualifications after careful analysis of data provided by your high school or other scholastic records, standardized tests, and school recommendations. In many cases an interview will be held to assess interests and scholastic abilities.

Minimum requirements are at least 16 units as follows: English, four units; history (social studies), two units; science (at least one unit in chemistry or physics), two units; mathematics (through trigonometry), three units; and electives, five or more units. A foreign language and mechanical drawing are recommended electives.

New York Regents grades of at least 70 per cent are required for admission. Applicants who do not offer Regents credit may take the Scholastic Aptitude Test of the College Entrance Examination Board, and/or subject area achievement tests.

## COLLEGE LIFE

Your freshman year will likely set the pattern of your undergraduate education. You will probably determine your standard of scholarship and the degree of participation in extracurricular activities for your college career. You will decide upon objectives and activities important to you. The management of your time for study, work or play, and the responsibility for your every action will rest with you. This is the period when you will make new friends and find your place in a new environment.

### *Orientation*

To help ease the adjustment to college life, ALL FRESHMEN AND NEW TRANSFER STUDENTS are required to attend an orientation period during registration week of the Fall semester. Here you will meet your classmates and members of the faculty and administration. You will become acquainted with the College, its functions and operation, and the various services available to you. A special orientation for foreign students is provided through the Office of International Forestry.

A weekly one-hour orientation course, General Forestry 032, is required throughout the semester for all freshmen students, including freshmen transfer students. In addition, a shorter orientation program is required for transfer students. During the early formative period in your college career, you will learn what is expected of you, and where to get help when you need it. Most of all, you will become acquainted with the general college policy which affects every student throughout his academic career.

### Work Load

Classes, laboratories, and study will occupy by far the greatest portion of your time at the College. Even though you anticipate working harder than ever before at college, you will find that it requires more time than you expected. The average freshman spends about 24 hours a week in class, and at least a like amount of time in out-of-class study. The usual credit hour load is 17.

Even so, you will have reasonable opportunity to participate in extracurricular activities. In these activities you will find social and recreational outlets and develop qualities of leadership, strengthen cultural and religious interests, and broaden your experience with people and organizations.

### Extracurricular Activities

STUDENT GOVERNMENT: As a member of the student body, you will participate in the election of class officers and the Student Council. The Council is the official representative body governing extracurricular student affairs. It supervises and finances a number of student activities.

PUBLICATIONS: The KNOTHOLE is a news sheet published periodically during the school year. It contains both news and opinion and is produced entirely by its student staff. The EMPIRE FORESTER is the College yearbook, and has a long tradition of excellence. It is published by a student staff with a faculty advisor.

PROFESSIONAL AND DEPARTMENTAL ORGANIZATIONS: There are several opportunities for you to join clubs that will advance your knowledge and broaden your acquaintance with students of similar interests. Following is a list of these organizations: Botany Club, Chemistry Club, Entomology Club, Forest Engineers Club, Forestry Club, Mollet Club (landscape architecture), Papyrus Club (pulp and paper), Wood Engineers' Club, Forest Zoology Club, and the student chapter of the Wildlife Society.

OTHER ORGANIZATIONS: Vox Silvae is an organization to improve the public speaking ability of students through debate. Robin Hood is the all-College Junior honorary society. Alpha Xi Sigma is the senior honorary society. Saengerbund is the College glee club. Traditions Council is an organization designed to preserve College traditions.

### Syracuse University

As stated previously, the College of Forestry is located adjacent to Syracuse University and a close relationship between the two institutions has been maintained through the years. Students may participate in Student Government, organizations, and other extracurricular activities at Syracuse University.

COURSES: Some of the required course work in general education and basic physical sciences at the College is taken at Syracuse University. Forestry students may also take electives related to their programs of study upon receiving their advisors' approval. Courses taken at Syracuse University are covered by the tuition and fees of the College of Forestry.

LIVING ON CAMPUS: Residence in a Syracuse University living center or an approved sorority house (upperclasses only) is required of all undergraduate women, although permission may be secured from the Dean of Women to live with blood relatives if the parents are willing to transfer all responsibility for the student to the relative concerned.

All men are required to live in University dormitories, and the University accepts the responsibility for the housing (dormitories or fraternities) of all undergraduate men.

Syracuse University housing units are available for married students. Veterans are given preference, but there are ordinarily apartments for non-veterans.

ATHLETICS: Payment of the general student fee entitles students to free admission to University home athletic events upon presentation of the official identification card, and the same applies to graduate students enrolled for six or more credit hours.

Athletic facilities for men include Archbold Gymnasium, which houses basketball courts, handball and squash courts, a rifle range, rowing tank, and championship-size swimming pool. A ski tow and lodge on University property at Skytop are centers of much interest and recreation during the winter. There are 22 tennis courts at the University. The new Manley Field House provides indoor practice facilities for many sports, including football, baseball, track, and lacrosse, and is the site of home basketball games.

Sports and dance activities for women offer the opportunity to acquire skill and understanding of these activities through the Department of Physical Education for Women.

## COLLEGE SERVICES

### *Academic and Personal Counseling*

The Office of Student Services is available throughout your college career as a place where you may seek, at any time, the advice of experienced counselors. The Dean of Students should be your first contact when questions or personal problems arise. General advisement for foreign students is provided by the Office of International Forestry. The Registrar in the Student Services Office is available as needed to provide information and guidance on general academic and specific program requirements. In addition, the Coordinator of Financial

Aids in the Student Services Office provides information on available scholarships, long-term state and federal educational loans, work opportunities at the College and major financial problems.

Traditionally, the College faculty has placed emphasis on academic advisement both formally and informally to meet individual student needs and considers this close faculty-student association to be a major academic strength. During registration you will be assigned to a faculty advisor to assist you as needed in your curriculum decision, program development, and elective decisions. When you select a curriculum, special advisors will be assigned to provide academic advice as needed. Faculty in your major department are available also for academic guidance. In addition, many classes are small, permitting students ample opportunity to discuss their courses and professional aspirations with instructors. While advice and counsel are available on an individual basis as needed, students at the College are encouraged early in their careers to become independent and responsible for their academic decisions as will be required in later professional life.

### Other Counseling

Full-time ministries are provided in all the major religious groups. They center their programs at Hendricks Chapel, except for Roman Catholics, who are served at Saint Thomas More Chapel. The Dean of Hendricks Chapel coordinates religious activities, working with eight full-time and six part-time denominational

chaplains and advisors. The program of Saint Thomas More Chapel is under the direction of a chaplain.

Extracurricular activities are under the guidance of a faculty committee, the members of which meet with students during planning sessions and offer their counsel when necessary.

Resident counselors are located in all dormitories, and are available for help and assistance if needed.

As students reach the end of their undergraduate years, they often seek career guidance. Highly motivated students should consider the question of whether or not to continue their education in graduate school. At the College, this sort of counseling is handled by the departments or divisions in which you take your major work. At the completion of your college career, placement counseling is available.

### *Health and Medical Facilities*

Students may consult a physician for medical care or health advice at the Syracuse University Student Health Service, and are entitled to unlimited visits to the out-patient clinic and also 10 days of confinement with ordinary medical care in the Infirmary per college year. Infirmary usage over 10 days will be at prevailing Infirmary rates. The usual laboratory examinations, if necessary for treatment or diagnosis of common illness, are in the main provided without cost. Most common drugs are provided without extra charge.

A student accident or sickness insurance plan is available and not only supplements the usual Infirmary privileges, but is also a health protection during the summer months when students are not under care of the Health Service. Married students with dependents who are not covered by Health Service privileges are strongly urged to provide themselves and their families with special insurance made available to University students. *All foreign students are required to carry health and accident insurance.* Graduate student insurance requirements are explained in Chapter VII.

### *Military Service*

The Registrar's Office keeps on file up-to-date information on Selective Service. A request for draft deferment as a college student, of course, must be made by you and certified by the Registrar. Students reaching 18 years of age after arriving in Syracuse, may register with Selective Service in the Office of Student Services.

A Reserve Officer Training Corps program is available, however, a minimum of two years is required. Continuation of R.O.T.C. during the junior and senior years must be approved by the College and the Military Department.

### *Hearing and Speech Center*

The Gordon D. Hoople Hearing and Speech Center provides remedial assistance to all regularly enrolled students who may be handicapped by hearing, speech, and voice disorders. This service is without expense to students.

### *Psychological Reseach Center*

Students desiring an analysis of their aptitudes, abilities, and interests may secure special testing programs at the Research Center.

### *Reading Laboratory*

The School of Education, in cooperation with the College of Liberal Arts and the Psychological Research Center, maintains a reading laboratory for research in the learning skills and for training teachers and specialists in reading. Representatives from the fields of medicine, speech, and psychology cooperate in making diagnoses and in planning remediation. Large numbers of University students use this facility to improve their reading skills.

## COLLEGE REGULATIONS

The complete rules and regulations governing all students while attending the College of Forestry, and residing on the Syracuse University Campus, are included in a separate publication entitled *Undergraduate Student Handbook.* It may be obtained from the Office of Student Services, and is distributed to students at registration. However, it is the student's responsibility to secure a copy and

become thoroughly familiar with it. The following information does not endeavor to prescribe in detail what is either permitted or denied, but rather is confined to some of the basic academic regulations and procedures of interest to entering students.

### Course Selection

Courses are to be chosen in accordance with the regulations of an established degree program, and it is the student's responsibility to plan his program so that all degree requirements are met.

### Course Load

Normally a full-time undergraduate student will register for a course load of 15 to 18 hours.

### Late Registration

A student who fails to report for registration or fails to complete registration during the authorized period, is subject to a penalty unless excused by the Dean of Students or his representative.

### Assignment of Grades

In each course final grades are given at the end of the semester and are expressed in letters as follows: A—excellent, B—good, C—average, D—minimum passing, F—failure, INC—incomplete, and in theses courses, S—satisfactory, U—unsatisfactory. An incomplete must be made up within one year (time not registered as a student does not count) or an F is recorded.

### Grade-Point Average

For the purpose of determining grade-point averages, letter grades have the following values: A, 4 points for each semester hour; B, 3 points for each semester hour; C, 2 points for each semester hour; D, 1 point for each semester hour; and F, no points. Both semester and cumulative scholastic averages are computed by dividing the total grade points accumulated by the total credit hours carried. Only courses carried at the College of Forestry or Syracuse University, including Utica College and University College, are used to compute grade-point averages.

### Academic Standards

A student whose cumulative or semester average falls below 2.00 (C) will have his record reviewed by the Academic Standards Committee. If the record indicates that he might be able to meet the requirements later, he will be placed on probation. If, however, in the judgment of the Committee, he will not be able to meet the requirement, he will be academically dismissed. Freshmen will not be dropped at the end of the first semester. They must achieve a 1.7 cumulative average or

better at the end of the second semester to be eligible to continue at the College.

### Graduation Requirements

A student will be recommended for graduation only if he has completed the required courses prescribed for his major, and has a minimum average of 2.00. In general, this requires four years' work, either at this College or in some other College of approved standing. Residence at this College during the final year is obligatory. In some degree programs there are requirements which must be completed during one of the summer periods.

### Academic Honors

Students achieving a 3.0 (B) average or above for the semester are placed on the President's Honor List and a commendation is sent by the President to both students and parents.

Graduation Honors: A student is recommended for the Bachelor degree *summa cum laude* if his average for the four years is 3.83 or better; for the degree *magna cum laude* if his average is 3.34 to 3.82; and for the degree *cum laude* if his average is 3.0 to 3.33.

## COST OF ATTENDING COLLEGE

The tuition and fee structure includes library, health, infirmary, physical education, R.O.T.C., special testing and other services, as well as an assessment for student activities and charges for expendable supplies and equipment. A non-refundable fee of $5 must accompany the application for admission, but is not required of transfers from other units of State University of New York. (Graduate students refer to Chapter VII.)

### *Residents of New York State*

Total tuition and fees of $435.00 to be paid as follows:

| | |
|---|---|
| Advance Payment* | $100.00 |
| Due at September registration | 167.50 |
| Due at February registration | 167.50 |
| Total | $435.00 |

### *Non-residents of New York State*

Total tuition and fees of $635.00 to be paid as follows:

| | |
|---|---|
| Advance Payment* | $100.00 |
| Due at September registration | 267.50 |
| Due at February registration | 267.50 |
| Total | $635.00 |

*Advance Payment of $100 is due within 30 days from the date of acceptance. It is refundable up to May 1.

### *Other Costs*

Assessment for the Student Loan Fund and Alumni Association membership of $1 is required for sophomores each semester, and all new transfer students in their first year. A commencement fee of $10 is required at the beginning of the semester in which the degree is expected.

Housing costs at Syracuse University range from $470 to $720 for 34 weeks depending upon the size of the room. Most rooms are for two students and are furnished with beds, mattresses, pillows, desks, chairs, study lamps, and dressers. A commercial linen service operates on campus and is available for those who order it.

Board costs at Syracuse University are $660 for 34 weeks, 20 meals weekly (none Sunday night). Housing and board rates are subject to change and inquiries about them should be sent to: Dean of Men, or Dean of Women, Syracuse University, Syracuse, New York 13210.

Other expenses, including books and supplies, average about $85 for the fall semester and $65 for the spring semester. Certain curriculums require a summer session in field forestry following the sophomore year, which lasts for 5 weeks and costs approximately $150. Extended field trips, lasting up to three weeks, are required in landscape architecture, and wood products engineering, and these range in cost from $75 to $200.

### Terms of Payment

A check or money order for tuition and fees should be made payable to "State University College of Forestry," and payment is made at the Business Office of the College. The advance payment should be mailed to the Business Office, College of Forestry, Syracuse, New York 13210.

*Payment for housing and board is made directly to Syracuse University.*

### Refunds

The following policies shall apply to tuition liability and refunds for students cancelling their registration.

A student who is given permission to cancel his registration shall be liable for payment of tuition in accordance with the following schedule:

| *Liability During* | *Semester* |
|---|---|
| 1st week | 0 |
| 2nd week | 30% |
| 3rd week | 50% |
| 4th week | 70% |
| 5th week | 100% |

No money shall be refunded unless application for refund is made within one year after the end of term for which the tuition requested to be refunded was paid to State University. The first day of class session shall be considered the first day of the semester and Saturday of the week in which this first class session occurs shall be deemed the end of the first week for refund purposes. It is interpreted that a student who does not attend any class sessions after Saturday of the first week and who notifies the College of his intent to cancel registration on or before the second Saturday following the first day of classes shall be deemed to have cancelled his registration during the first week.

There shall be no tuition or fee liability established for a student who withdraws to enter military service prior to the end of an academic term for those courses in which he does not receive academic credit.

A student who is dismissed for academic or disciplinary reasons prior to the end of an academic term shall be liable for all tuition and fees due for that term.

A student who cancels his registration at a unit of the State University and within the same term registers at another unit of the State Universiy, shall be entitled to full credit for tuition and fees paid for that term.

Notwithstanding any other provisions for refund, when a student has withdrawn through circumstances beyond his control, under conditions in which the denial of refund would cause undue hardship, the Chief Administrative Officer of the unit, may, in his discretion, determine that no liability for tuition has been incurred by the student, provided the student has not completed more than one half of the term and has not received or will not receive academic credit for the term. Such action, including the reason therefore, shall be in writing.

## FINANCIAL AID

It is easier today than ever before to finance a college education. Various types of scholarships, government aid, and loans are available at the College of Forestry for students who need financial assistance. Scholarships and loans are often obtained from sources in the students' home communities, such as companies, fraternal organizations, service clubs, churches, alumni groups and the like.

Complete information on financial assistance may be obtained from the Coordinator of Financial Aids at the College, either directly or by mail. Some of the various types of aid, however, are listed below:

For New York State residents, the Scholar Incentive Program, Regents Scholarships, and State University Scholarships offer possible financial aid. The New York Higher Education Assistance Corporation offers loans to residents which are interest free until 9 months after college, and then draw 7 per cent annual interest. Repayment of a loan cannot be scheduled for more than a 10-year period.

Any undergraduate student in good standing and who needs financial assistance may borrow up to $1,000 per year (graduate student $2,500) under the Student Loan Program of the National Defense Education Act of 1958. No interest will accrue until 9 months after college, and part of the loan will be cancelled if the student becomes a public elementary or secondary school teacher or college teacher. A 10-year repayment period is allowed.

The College is a recipient of funds from the Higher Education Act of 1965. These funds enable the College to award Educational Opportunity Grants to students who have exceptional financial need. These grants range from $200 to $1,000 per year.

The College of Forestry Alumni Association offers a variety of assistance. Memorial Awards are made to outstanding students, interest-free loans are available to meet emergency expenses, and several educational grants ranging from $200 to $500 each are made each year.

A limited number of tuition waivers are available for award to qualified foreign students.

Special financial assistance includes the following: Charles Lathrop Pack Awards, Charles Malcomb Harlow Memorial Loan Fund, Friedrich U. Klaehn Memorial Scholarship in Silviculture, David B. Schorer Memorial Fund, Edward Vail Emergency Fund, C. Ives Gehring Memorial Fund, James D. Judson Memorial Fund, Portia Farrell Morgan Scholarship, Jack L. Krall Memorial Scholarship Fund, Boston Paper Trade Association Scholarship, Phyllis Roskin Memorial Award, State University at Syracuse Chapter of CSEA Scholarship, and the Student Association Grants.

Other opportunities include: Allied Paper Salesmen's Association Award, Harold L. Austin Memorial Scholarship, Boxboard Research and Development Scholarship, Nelson Courtlandt Brown Scholarship Fund, Henry H. Buckley Student Aid Awards, Geigy Dyestuff's Scholarship, C. E. Libby Award, Milton Conservation Club Award, Frank B. Myers Memorial Award, New York-Canadian Division of Paper Industry Management Association Scholarship, Pen-Jer-Del Division of the Paper Industry Management Association Scholarship, Plastics Engineer's Award, St. Regis Paper Company Scholarship, and Syracuse Pulp and Paper Foundation Scholarships.

In addition, work grants are available to pre-freshmen; there are part-time work opportunities at the College, and the Economic Opportunity Act of 1964 offers a work-study program.

## HOW TO APPLY FOR ADMISSION

### *Entering Freshmen*

To apply for admission, you should request the proper forms and information from the College's Office of Admissions. Allow about three weeks for delivery of this material. Revised forms are available beginning in September of one year for entry the following year.

Early acceptance for September admission will be given when warranted by the record supporting an application, and notices of early acceptance are mailed beginning December 15. The target date for final decision on most applications for September entry is April 1. A copy of the message of decision on an application is sent to the applicant's high school. (Graduate students refer to Chapter VII.)

### *Transfer Students*

Students with previous college experience, or who are currently enrolled at another college may apply for transfer. Transfer applications are considered for February as well as September. However, February transfer will depend upon the availability of courses appropriate to the curriculum selected.

It is College policy that any student who is academically dismissed must wait at least one semester before applying to this college.

Students with two years of college can generally arrange their programs to allow transfer to the College of Forestry as a junior, with the exception of Landscape Architecture, which may require three years at the College to complete degree requirements. For detailed information concerning transfer requirements, please refer to page 38.

In applying to the College for transfer, it is your responsibility to submit a recent official transcript from the college you are currently attending, and similar documents from all colleges previously attended. Also, a catalog from each college may be required.

### *International Students*

The College accepts international students on the undergraduate level if they can satisfy all regular admissions requirements. It is recommended, however, that students from foreign countries obtain their baccalaureate degree in their home country if at all possible and apply to the College as a graduate student. Experience has shown that this arrangement provides for greater academic achievement and more efficient use of the student's time and funds. If an international student wishes to apply as an undergraduate, he must meet the secondary school requirements for entrance; show that he is proficient in the English language through acceptable results of the TOEFL test and/or College Entrance Examination Board Achievement Test in English; provide competitive scores on the C.E.E.B.'s Scholastic Aptitude Test in the verbal and math areas; and produce evidence that he can meet all financial obligations.

Undergraduate foreign students must file official State University of New York admissions forms. These may be obtained by writing to the Director of Admissions at the College. No fee is required for processing the application. If the foreign student is accepted, he must obtain adequate health and accident insurance before he will be allowed to register at the College.

International students who are currently enrolled at an American college may apply for transfer to the College. They must meet all regular entrance requirements plus those of a Transfer Student as listed on page 38. Permission to transfer must be obtained from the U.S. Immigration and Naturalization Service district office having jurisdiction over the college in which the student is currently enrolled.

### *Admission Examination*

State University of New York requires an applicant for admission (except foreign students) to take its standardized State University Admissions Examination if the applicant is residing or attending school in the State during the year prior to entrance to college. The College Director of Admissions may waive the requirement for, (1) applicants from outside New York State, who must substitute scores earned in the Scholastic Aptitude Test of the College Entrance Examination Board, (2) late applicants, and (3) applicants for admission as transfers from another college.

Information about the times and places that the examination is held is provided in the kit of application materials. The Regents Scholarship Examination, given in high schools of New York during the first part of October, serves as a State University Admissions Examination. Scores that an applicant earns on either examination are provided to the College as confidential information from the State University of New York.

### Health Examination Report

Each new student is required to submit a history and physical examination report on a form that will be sent after the initial acceptance notice. *It is to be completed and returned within two weeks to the Admissions Office, State University College of Forestry, Syracuse, New York 13210.*

### Entrance With Advanced Standing

Secondary school students may earn credit toward the B.S. or B.L.A. degree before enrolling as freshmen at the College. This enables students to carry higher course loads, and may be accomplished in two ways:

1. Evening and Saturday courses in mathematics or English, for instance, given by a nearby college may be open to recommended high school seniors. After successful completion, an official transcript or other appropriate document should be sent to the College by the institution along with a catalog description of the course or courses.

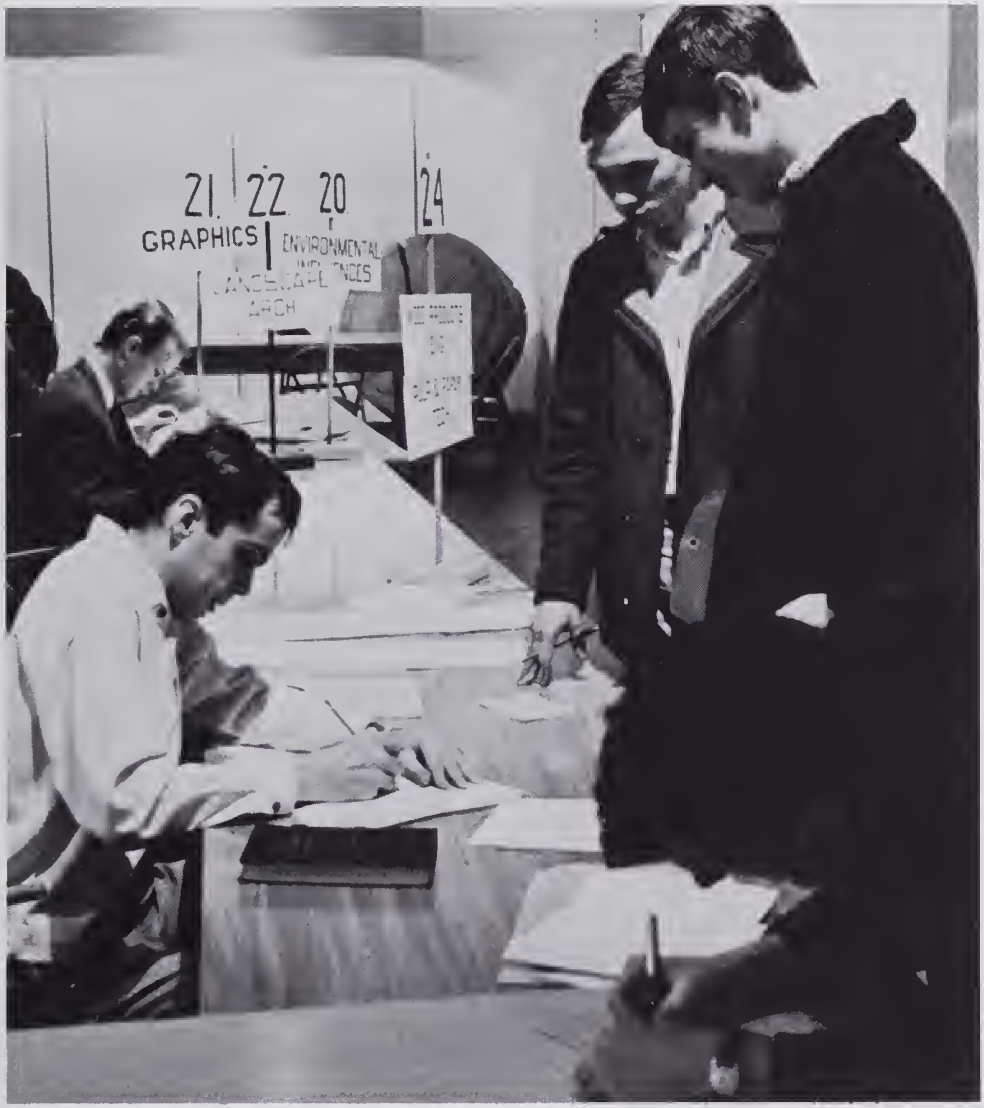
2. College-level courses given by high schools in the Advanced Placement Program of the College Entrance Examination Board to recognize and develop academic talent. Such courses as biology, mathematics, chemistry, English, and foreign languages offer opportunity for degree credit at this College. The determination of credit is made by faculty members to whom the student's final examination papers are sent after they have been graded.

### College Proficiency Examinations

The New York State College Proficiency Examination Program is a means by which students may receive college credit for specific courses by examinations, without being in residence for a course or taking structured correspondence lessons. The College also accepts the College Level Examination Program (CLEP) of the College Entrance Examination Board. These examinations are open to all who make application.

The College approves of the CPE and CLEP programs in general and will evaluate the performance of participants. Satisfactory performance by a student must be demonstrated during at least one semester in residence at this College before granting credit. This residence may be prior or subsequent to the examination.

If all College policy requirements are met, grades A and B will receive credit; credit for a grade of C will be granted only upon recommendation of the depart-



ment of the applicant's major; and no credit will be granted for a grade lower than C.

Application for credit should be made to the Office of Student Services. Application for deviation from the prescribed policy may be made to the Academic Standards Committee for undergraduate credit and the Committee on Graduate Studies for graduate credit.

# V

# UNDERGRADUATE PROGRAMS

## ENTERING FRESHMEN

The seven curriculums described in Chapter III lead to a Bachelor of Science degree, and the five-year Landscape Architecture curriculum leads to a Bachelor of Landscape Architecture degree.

Entering freshmen will review the demands and opportunities of the curriculums with an assigned advisor during the registration period, in order to select the first-semester elective. Before the end of the first semester, however, each freshman must make his curriculum choice. In reaching this decision he will be assisted as needed by faculty advisors, the Dean of Students, by conversations with upperclassmen, and by first-hand acquaintance with the College's programs, facilities, and personnel.

### FRESHMAN YEAR — FIRST SEMESTER — ALL CURRICULUMS

| | | *Credit Hours* |
|---|---|---|
| *F. Botany 100 | General Botany | 4 |
| English | Freshman English | 3 |
| Mathematics | | 3 |
| **Chemistry 106 | General Chemistry | 4 |
| **Elective | | 3 |
| Orientation | | 0 |
| Phys. Educ. or ROTC | | 0 |
| | | 17 |

Students interested in meeting the education requirements for intitial professional forestry positions in federal and state resource managing agencies are able to qualify fully by successful completion of either the Resources Management curriculum or the Forest Engineering curriculum. They may also do so in the Forest Biology curriculum through selection of appropriate forestry courses as electives, under guidance of a faculty advisor.

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*Those students who definitely know that they are going to pursue the Materials Marketing Option in Wood Products Engineering should take F. Economics 290: Introduction to Economics for Forestry, 3 credit hours and Graphics 280: Technical Drawing, 1 credit hour, instead of F. Botany 100, 4 credit hours.

**Students who definitely know they are going to pursue the Environmental Studies and Landscape Architecture Curriculums will substitute Philosophy 105, 3 credit hours, for Chemistry, 4 credit hours, and will take Graphics 182: Art Media I, 1 credit hour, as their elective, for a total semester load of 14 credit hours.

## TRANSFER STUDENTS

The College of Forestry has designed its undergraduate curriculums to accommodate entering transfers from two-year and other colleges. Students taking recommended course series or Associate degree programs containing specified courses generally may register at the entering junior level without credit loss. The various course or program requirements for effective transfer are listed in each curriculum description in the following section. Attendance at a College of Forestry summer session provides added opportunity for transfers as needed to complete special program requirements.

Transfer students will be held for the total credit hour requirement of the curriculum in which they are enrolled. The Admissions Office will be pleased to answer questions concerning transferring, and to evaluate records and advise on courses where there are questions. Students applying for transfer will generally follow the admissions procedures described on page 32.

## DUAL ENROLLMENT WITH TWO YEAR COLLEGES

The College of Forestry has completed an arrangement for a dual enrollment program with Columbia-Greene Community College for those students who wish to transfer to the College. Any applicant for the Liberal Arts, Math and Science program with a Forest Management concentration at the two-year college is evaluated by both institutions. Upon acceptance and successful completion of the Associate in Science degree, the student is automatically accepted to the College of Forestry. Dual enrollment programs are to be expanded to other two-year colleges in the near future.

## FOREST BIOLOGY

The Forest Biology Curriculum is designed to educate biologists, and to provide them an orientation to forestry principles. This program was developed for those students planning graduate study in the biological sciences as well as those seeking positions as forest biologists in forestry, such as forestry research, disease and insect control, recreation, fish and wildlife biology, or conservation. The effective management and protection of forests and related natural resources are becoming increasingly dependent on the research contributions and professional guidance of biologists for solutions of a wide range of natural resource problems.

The curriculum is built around a core of required courses which provides a sound background in biology and the physical sciences, an introduction to forestry principles, and a general education. It is designed to achieve breadth in biology as well as depth in a selected concentration area. The Forest Biology Curriculum is flexible and a variety of programs may be developed within or across the various participating departments to meet the academic goals and special subject interests of the student. Each student is assigned an advisor to aid in program decisions.

All students are considered to be majoring in *biology*.

General requirements for federal state biology positions are met. Position requirements in a broad range of special biological fields related to natural resources also may be achieved by selection of electives. Requirements for federal and state forestry positions may be satisfied by choosing specified forestry subjects as electives.

The curriculum has been arranged to facilitate transfer of students from the State University Community Colleges at the end of their freshman or sophomore years. Recommended core courses for students planning to transfer as entering juniors total 64 credits or an Associate degree and include:

| | |
|---|---|
| Biology | 8 credits |
| General Chemistry | 8 credits |
| Organic Chemistry | 8 credits |
| Physics | 8 credits |
| Mathematics through Integral Calculus | 8 credits |
| Economics | 3 credits |
| English | 6 credits |
| *Electives | 14 credits |

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*To include 3 courses totalling 9 credits in the humanities and social sciences.

Attendance at a 5-week Summer Session course in Field Forestry at the Pack Demonstration Forest, Warrensburg, N.Y., is required. In special cases, attendance at the Cranberry Lake Biological Station or its equivalent may be substituted (see note 2 below).

In addition to the courses specified in the program, students must meet the following requirements:

1) Twelve credits in a selected biology concentration (zoology or wildlife biology, botany, forest entomology, silvics).

2) Six credits in a second biological area.

3) The courses selected in the concentration subjects should include at least one from each of three of the following broad areas of biology: physiology, classification, structure-development, and ecology.

4) Three credits in the resources management area.

5) Nine credits in the humanities and social sciences selected with the approval of the faculty advisor.

6) Twenty-seven credits in elective courses selected with the approval of the faculty advisor.

### *Electives*

1. Students planning graduate study are urged to take two semesters of a language (as approved by their faculty advisor) as a part of their humanistic-social sciences electives requirement.
2. Students planning to meet special requirements for biology specialty positions in federal and state service should review the available Civil Service publications and become familiar with the specific course requirements to be met by elective substitution with the approval of the faculty advisor.
3. Students planning to meet special requirements for federal Civil Service positions in forestry at the GS-5 and GS-7 levels may do so by electing 10 credits in additional forestry courses and attending the Summer Session in Field Forestry at Warrensburg, N.Y. These special forestry requirements may be fulfilled by courses selected with the approval of the faculty advisor.

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1. *Mathematics through integral calculus (Math 227 or the equivalent) is required.
2. **Students with a 2.5 academic average or better may substitute for this requirement 6 credit hours of courses at the Cranberry Lake Biological Station or other biological field stations. The courses selected must have the approval of the student's advisor. A minimum of 6 credit hours is required and it is preferable that the summer program be taken between the junior and senior years.
3. Five credits of additional forestry courses are recommended for those students not attending the Summer Session In Field Forestry.
5. A total of 132 credit hours is required in this curriculum.

# FOREST BIOLOGY CURRICULUM

## Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 | | | |
| | | 17 | | | 17 |

## Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| F Biol 320 | General Ecology | 3 | F Econ 300 | Intro to Macro-Economics | 3 |
| Electives | | 6 | Electives | | 6 |
| | | 17 | | | 17 |

Summer Session Alternate A**

SUMMER SESSION IN FIELD FORESTRY
5 weeks, 6 credit hours. This program is conducted in two separate sessions during the summer period at the College's Pack Demonstration Forest near Warrensburg, N.Y.

**See Note 2 below.

| | | |
|---|---|---|
| F Biol 301 | Field Biology | 1 |
| Silvi 302 | Silvics | 1 |
| F Mgt 303 | Introduction to Forest Measurements | 1 |
| Res Mgt 304 | Silviculture—Resources Management | 3 |
| | | 6 |

## Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 210 | Dendrology I | 2 | F Bot 211 | Dendrology II | 1 |
| F Econ 500 | Elements of Forest Entomology | 3 | A M 571<br>or<br>A M 591 | Introduction to Statistical Analysis (3)<br>Introduction to Probability and statistics (3) | 3 |
| F Biol 330 | Principles of General Physiology | 3 | Geol 105<br>or<br>Silvi 332<br>and<br>Silvi 333 | Introductory Geology (3)<br>Soils (2)<br>Soils Lab (1) | 3 |
| Electives | | 6 | Electives | | 6 |
| | | 14 | | | 13 |

Summer Session Alternate B**

SUMMER SESSION IN ENVIRONMENTAL BIOLOGY
8 weeks, 6-8 credits. Courses selected require approval of the student's advisor. Program conducted in July-August at the Cranberry Lake Biological Station, Pack Experimental Forest, Cranberry Lake.

Summer Session Alternate C**

Attendance at other approved biological field stations may be arranged. The courses selected must have the prior approval of the student's advisor.

## Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Biol 570 | Fundamentals of Genetics | 4 | Electives | | 15 |
| Electives | | 12 | | | |
| | | 16 | | | 15 |

## FOREST CHEMISTRY

By selecting proper electives, students in either of the two following options may be certified on graduation as having completed an American Chemical Society approved curriculum. Both options are excellent grounding for professional work at the B.S. level or for advanced graduate study.

Recommended core courses for students planning to transfer as entering juniors total 64 credits or an Associate degree and include:

| | |
|---|---|
| Biology | 8 credits |
| General Chemistry | 8 credits |
| Organic Chemistry | 8 credits |
| Physics | 8 credits |
| Mathematics through Integral Calculus | 8 credits |
| Economics | 3 credits |
| English | 6 credits |
| Electives | 14 credits |

### *Biochemistry and Natural Products Option*

This option is designed for students who wish to approach problems in the life sciences with the tools and point of view of the chemist. In addition to a major concentration in the several branches of chemistry, the student obtains a solid grounding in the fundamentals of physics, mathematics, and biology. Professional electives can provide a minor concentration in botany, ecology, entomology, zoology or physiology. Collaborative efforts of chemists and biologists are providing new solutions to problems of environment, natural resources and health.

---

1. *One course of mathematics or applied mathematics beyond Math 227 or Math 397, or equivalent, is required.
2. **A sequence of professional electives should be chosen in the junior year. In addition to the freshman biology courses, a student whose emphasis is in biochemistry must take 3 semester hours of genetics and at least another 3 semester hour biology course. A student whose emphasis is in natural products must take 3 semester hours of biology in addition to the freshman biology courses and an additional hour of organic chemistry laboratory (FC 496) and a second hour of FC 584.
3. ***F Chem 556: Polymer Properties (3 credit hours) is suggested.
4. ****Petition by student to the Department for replacement of this requirement will be considered to allow time for special interest.
5. *****GF 502 may be substituted.
6. A total of 129 credit hours is required in this option.

# FOREST CHEMISTRY CURRICULUM
# BIOCHEMISTRY AND NATURAL PRODUCTS CHEMISTRY OPTION

## Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| GF 032 | Orientation | 0 | | | |
| | | 17 | | | 17 |

## Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| Phys 105 | General Physics for Science Students I | 4 | Phys 106 | General Physics for Science Students II | 4 |
| Elective | | 3 | F Econ 290 | Introduction to Economics for Forestry | 3 |
| | | 16 | | | 16 |

## Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 325 | Organic Chemistry III | 3 | *Math or Elective | | 3 |
| Chem 332 | Quantitative Analysis | 2 | Chem 434 | Instrumental Analysis | 2 |
| Chem 333 | Quantitative Analysis Lab | 1 | Chem 435 | Instrumental Analysis Lab | 1 |
| Chem 346 | Physical Chemistry | 3 | Chem 356 | Physical Chemistry | 3 |
| F Chem 584 | Spectrometric Identification of Organic Compounds | 1 | Chem 357 | Physical Chemistry Lab | 1 |
| **Professional | Elective | 2-4 | **Professional | Elective | 2-3 |
| Elective | | 3 | Elective | | 3 |
| | | 15-17 | | | 15-16 |

## Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 495 | Introduction to Professional Chemistry | 1 | ****F Chem 498 | Introduction to Research | 6 |
| F Chem 572 | Chemistry and Biochemistry of Wood | 3 | F Chem 497 | Undergraduate Seminar | 1 |
| F Chem 573 | Cellulose and Wood Chemistry Lab | 1 | F Chem 532 | Biochemistry II | 3 |
| F Chem 530 | Biochemistry I | 3 | *****Pub Add 215 | Public Speaking | 3 |
| F Chem 531 | Biochemistry Lab | 2 | Elective | | 3 |
| ***Electives | | 6 | | | |
| | | 16 | | | 16 |

### *Wood and Polymer Chemistry Option*

This option is designed for students interested in the structure and physical properties of man-made and natural materials, the giant molecules of wood, plastics, polysaccharides, proteins, rubbers and fibers. The recently discovered chemistry of these materials constitutes one-half the concern of chemical industry and is the origin of a major revolution in our way of life and our understanding of nature. This special subject area is an advanced core of studies beyond the basic courses of the classical undergraduate chemistry curriculum.

---

1. *One course of mathematics or applied mathematics beyond Math 227 or Math 397, or equivalent, is required.
2. **A sequence of two or more professional electives in related disciplines with a minimum of 5 credits should be chosen in the fall of the junior year from the College of Forestry offerings. Wood Products Engineering and Paper Science and Engineering courses are recommended.
3. ***F Chem 530: Biochemistry I (3 credit hours) is suggested.
4. ****Petition by student to the Department for replacement of this requirement will be considered to allow time for special interest.
5. *****G F 502 may be substituted.
6. A total of 129 credit hours is required in this option.

## FOREST CHEMISTRY CURRICULUM
## WOOD & POLYMER CHEMISTRY OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| GF 032 | Orientation | 0 | | | |
| | | 17 | | | 17 |

### Sophomore Year

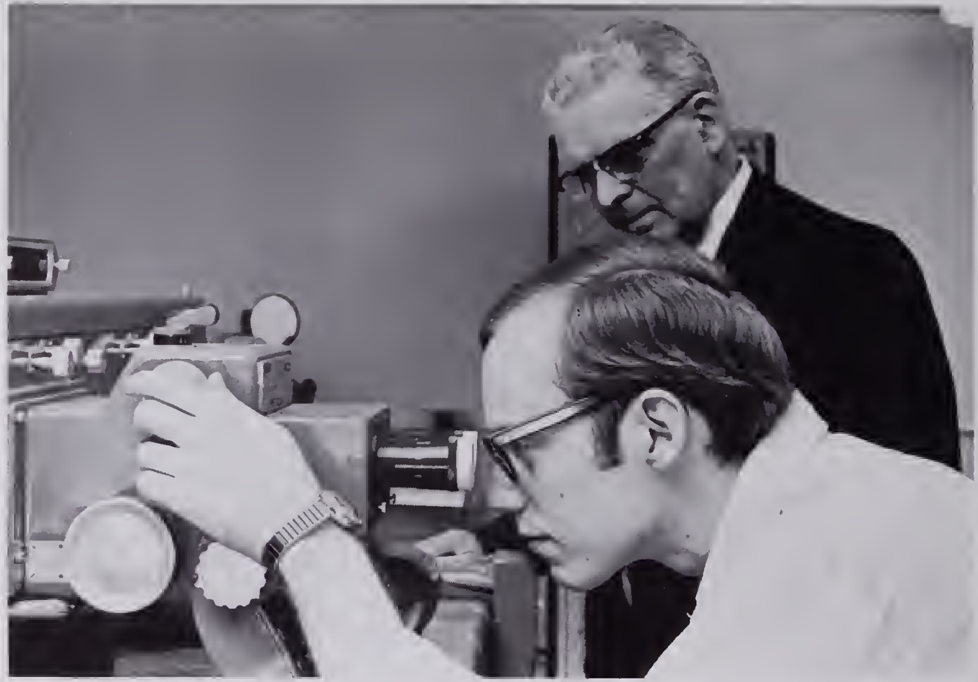
| | | | | | |
|---|---|---|---|---|---|
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| Phys 105 | General Physics for Science Students I | 4 | Phys 106 | General Physics for Science Students II | 4 |
| Elective | | 3 | F Econ 290 | Introduction to Economics for Forestry | 3 |
| | | 16 | | | 16 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 325 | Organic Chemistry III | 3 | *Math or Elective | | 3 |
| Chem 332 | Quantitative Analysis | 2 | Chem 434 | Instrumental Analysis | 2 |
| Chem 333 | Quantitative Analysis Lab | 1 | Chem 435 | Instrumental Analysis Lab | 1 |
| Chem 346 | Physical Chemistry | 3 | Chem 356 | Physical Chemistry | 3 |
| F Chem 584 | Spectrometric Identification of Organic Compounds | 1 | Chem 357 | Physical Chemistry Lab | 1 |
| **Professional | Elective | 2-4 | **Professional | Elective | 2-3 |
| Elective | | 3 | Elective | | 3 |
| | | 15-17 | | | 15-16 |

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 495 | Introduction to Professional Chemistry | 1 | ****F Chem 498 | Introduction to Research | 6 |
| F Chem 550 | Introduction to Polymer Chemistry I | 3 | F Chem 552 | Introduction to Polymer Chemistry II | 3 |
| F Chem 551 | Polymer Techniques | 2 | F Chem 497 | Undergraduate Seminar | 1 |
| F Chem 572 | Chemistry & Biochemistry of Wood | 3 | *****Pub Add 215 | Public Speaking | 3 |
| F Chem 573 | Cellulose and Wood Chemistry Lab | 1 | Elective | | 3 |
| ***Electives | | 6 | | | |
| | | 16 | | | 16 |



## FOREST ENGINEERING

The primary objective of this curriculum is to prepare qualified graduates who will operate with professional engineering competence within the context of forestry and natural resources development. It is an engineering curriculum, fundamentally interwoven with essential principles of forestry to develop environmental understanding and ecological awareness.

The curriculum consists of a four-year program at the College of Forestry preparatory to a fifth year in either civil, industrial or mechanical engineering at Syracuse University. The Bachelor of Science degree will be awarded by the College upon completion of the four-year program; a Bachelor of Science degree in Engineering will be awarded by Syracuse University upon completion of requirements in a fifth year. Graduate programs at the College, building upon the four-year Forest Engineering Curriculum, are also possible during the fifth year.

Minimum professional requirements, both in Forestry and Engineering, are met by the core of required courses, and these are strengthened in areas suited to the student's goals through proper advisory use of the electives that may be taken throughout the program.

Graduates with Associate degrees in engineering science or science and mathematics usually find transfer acceptance as entering juniors. Students looking forward to career opportunities in Forest Engineering are urged to obtain guidance on specific requirements from the Admissions Office of the College of Forestry as early as possible in their preparatory programs.

# FORESTRY ENGINEERING CURRICULUM

## Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective (Philosophy preferred) | | 3 | Elective (Philosophy preferred) | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| GF 032 | Orientation | 0 | | | |
| | | 17 | | | 17 |

## Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Bot 210 | Dendrology I | 2 | F Bot 211 | Dendrology II | 1 |
| Gr 280 | Technical Drawing | 1 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| Elective (Logic) | | 3 | Geol 105 | Introductory Geology | 3 |
| Elective | | 3 | Elective | | 3 |
| | | 16 | | | 17 |

## Junior Year

| | | | | | |
|---|---|---|---|---|---|
| A M 591 | Introduction to Probability and Statistics | 3 | F Engr 301 | Plane and Geodetic Surveying | 3 |
| F Econ 301 | Introduction to Micro-Economics | 3 | F Engr 563 | Photogrammetry | 3 |
| M E 225 | Engineering Mechanics | 4 | F Engr 340 | Hydrology | 3 |
| Silvi 351 | Meteorology and Fire Behavior | 3 | Silvi 324 | General Silviculture | 3 |
| A M 360 | Introduction to Computer Programming | 3 | C E 325 | Mechanics of Deformable Bodies | 3 |
| | | | Elective | | 3 |
| | | 16 | | | 18 |

## Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Mgt 554 | Forest Administration and Policy | 3 | F Mgt 552 | Management Planning and Operations | 3 |
| F Econ 510 | Principles of Forestry Economics | 3 | Elective (Legal concepts recommended) | | 3 |
| C E 437 | Soil Mechanics and Foundations I | 3 | M E 226 | Engineering Mechanics | 3 |
| F Engr 410 | Structures | 3 | F Mgt 522 | Mensuration | 3 |
| F Engr 412 | Principles of Production (Harvesting) | 3 | Elective | | 3 |
| Elective | | 3 | Recommended: | | |
| Recommended: | | | C E 332 | Structures II | |
| Math 585 | Higher Mathematics for Engineers and Scientists I | | or | | |
| or | | | I E 526 | Analytical Methods in Industrial Engineering | |
| F Engr 760 | Analytical Photogrammetry I | | or | | |
| | | | F Engr 761 | Analytical Photogrammetry II | |
| | | 18 | | | 15 |

1. *Mathematics through Math 328, or the equivalent, is required.
2. A total of 134 credit hours is required for the B.S. degree from the College of Forestry in this curriculum.

## LANDSCAPE ARCHITECTURE

Professional education in the design professions today is witness to a great deal of concern for school objectives, programs, and organization. The central issue relates to the force and pace of change that characterizes the work of the environment designer and brings him into ever new challenging situations. The condition of our cities, depletion of natural resources, and pollution of our air and water all pose severe and complex threats to our society. Concurrently, a greater awareness and desire for environmental quality tax the resources and ingenuity of those in the design professions.

Several trends have emerged in recent years that suggest conditions for present and future educational programs. It is clear that an interdisciplinary approach to environmental problems is indicated and includes landscape architecture, architecture, engineering and planning, with specific attention to the biological and behavioral sciences. It is also clear that the educational purpose must relate more directly to the health and well-being of man and be designed for versatility rather than the narrow concerns of career orientation. Finally, that contemporary education should orient the student to systems thinking in his approach to knowledge, society, and the individual.

In an effort to recognize and respond to the demands and responsibilities of our times, the following curriculum is offered in environmental studies and landscape architecture. The major characteristics of the program are:

1. An expansive frame of reference for landscape architects as major contributors to the solution to environmental problems, with a concurrent broad educational base for their professional training.
2. Provision for flexibility to accommodate shifts in educational goals, particularly within the design professions.
3. Articulation with the programs of the two-year colleges to permit ready transfer to professional programs.
4. Professional training to more adequately meet the educational standards of accrediting bodies, the American Society of Landscape Architects and the Division of Professional Education of the New York State Education Department.

The curriculum is based on three consecutive educational sequences:

1. The first two years may be taken at this college or at any other school or college. Students may transfer into the freshman, sophomore, or junior programs, depending upon acceptable transfer credit.

   Requirements for students planning to transfer as entering juniors are as follows: (a) Associate degree or acceptable transfer credit totalling a minimum of 60 semester credit hours or their equivalent; (b) biology, 3 credits, and technical drawing, 3 credits; and (c) the equivalent of college algebra and trigonometry plus high school chemistry or physics.

A recommended course series prior to transfer would include:

| | |
|---|---|
| English (Composition) | 4 credits |
| English (Literature) | 6 credits |
| Speech | 3 credits |
| Biological Sciences | 6 credits |
| Social Sciences | 9 credits |
| Art Media | 2 credits |
| Geology | 3 credits |
| Geography | 3 credits |
| Humanities | 6 credits |
| Technical Drawing | 3 credits |
| Surveying | 3 credits |

This series is strongly recommended but not required. Deficiencies in these areas will be accommodated as possible during subsequent semesters and summer school sessions.

2. The third and fourth years are devoted to a broad spectrum of courses dealing with a variety of aspects of environment and man's relationship to it, synthesized through development of ability in both the functional and creative design processes. In order to provide as great an exposure as possible to the interrelationship of culture and environment, the final semester of the fourth year is conducted at a university in a foreign location, where course work is taught by members of the staff of the School of Landscape Architecture and by staff of the host school. The exact site of this foreign study program will vary at 2- to 3-year intervals as the location is shifted to maximize faculty and student contact with a variety of cultural-environmental situations and conditions.

   The successful completion of this 127-hour program qualifies the student to receive a Bachelor of Science degree with a major in Environmental Studies. The education has been broad but with sufficient training to focus the student's concerns for the physical environment and its significance. At this point, students may enter the field for a trial experience in professional practice, may choose to pursue graduate study in a discipline other than landscape architecture, or may elect to continue study toward a professional degree.

3. The fifth year is devoted to a concentration of professional courses aimed at preparing graduates for the profession of landscape architecture. Successful completion of this 33-hour program leads to the degree of Bachelor of Landscape Architecture, the first professional degree. Study beyond this point is accommodated by our Master of Landscape Architecture program.

# LANDSCAPE ARCHITECTURE CURRICULUM

## First Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | F Zool 100 | General Zoology | 4 |
| F Bot 100 | General Botany | 4 | E I 113 | Intro. to Environmental Studies | 3 |
| Phil 105 | Problems of Knowledge | 3 | F Econ 290 | Intro. to Economics for Forestry | 3 |
| Graphics 182 | Art Media I | 1 | Graphics 183 | Art Media II | 1 |
| Phys Ed or ROTC | | 0 | *Elective | | 3 |
| GF 032 | Orientation | 0 | Phys Ed or ROTC | | 0 |
| | | 14 | | | 17 |

## Second Year

| | | | | | |
|---|---|---|---|---|---|
| **English | | 2-3 | **English | | 2-3 |
| F Bot 210 | Dendrology I | 2 | Phil 351 | Concepts in Logic | 3 |
| F Mgt 201 | Plane Surveying | 3 | Gr 281 | Landscape Architectural Drafting | 3 |
| Gr 284 | Art Media III | 1 | E I 211 | General Geography | 3 |
| Psych 205 | Foundations of Human Behavior | 3 | Soc 201 | Introductory Sociology | 3 |
| *Elective | | 3 | Gr 285 | Art Media IV | 1 |
| | | 14-15 | | | 15-16 |

## Third Year

| | | | | | |
|---|---|---|---|---|---|
| LA 322 | Basic Design | 2 | LA 325 | Landscape Design Studio I | 2 |
| LA 324 | Intro. to Landscape Architecture | 3 | LA 343 | Structural Materials and Elements | 3 |
| Gr 382 | Graphics | 2 | LA 345 | Elements of Site Engr. | 3 |
| F Biol 320 | General Ecology | 3 | Gr 383 | Graphics | 2 |
| ***Elective | | 3 | AM 360 | Intro. to Computer Programming | 3 |
| ***Elective | | 2-3 | EI 311 | Principles of Land Use | 3 |
| | | 15-16 | | | 16 |

Summer Session

LA 333: Plant Materials. Three-week course in Plant Materials, 3 credit hours, conducted at Farmingdale, New York.

## Fourth Year

| | | |
|---|---|---|
| LA 420 | Landscape Design Theory I | 2 |
| LA 422 | Landscape Design Studio II | 4 |
| LA 430 | Plant Materials Culture | 3 |
| LA 440 | Site Development Systems | 3 |
| E I 470 | Art History | 3 |
| ****Elective | | 3 |
| | | 18 |

FOREIGN LOCATION

| | | |
|---|---|---|
| LA 421 | Landscape Design Theory II | 2 |
| LA 423 | Landscape Design Studio III | 4 |
| LA 463 | Architecture I | 3 |
| E I 411 | Socio-Cultural Impacts on Environmental Design | 3 |
| E I 471 | History of Landscape Architecture | 3 |
| | | 15 |

## Fifth Year

| | | |
|---|---|---|
| LA 522 | Landscape Design Studio IV | 4 |
| LA 544 | Professional Practice Studio I | 1 |
| LA 562 | Architecture II | 2 |
| EI 550 | Fundamentals of City & Regional Planning | 3 |
| †Professional Elective | | 3 |
| ***Elective | | 3 |
| | | 16 |

| | | |
|---|---|---|
| LA 525 | Landscape Design Studio V | 4 |
| LA 545 | Professional Practice Studio II | 2 |
| LA 547 | Principles of Professional Practice | 2 |
| F Bot 525 | Forest Ecology | 3 |
| †Professional Elective | | 3 |
| ***Elective | | 3 |
| | | 17 |

1. *All students must have completed the equivalent of college algebra and trigonometry plus high school chemistry or physics before entering third year. When these requirements are completed, this becomes a free elective. (See note 3.)
2. **Based on individual preference and performance in first year course work, second year English courses will be determined in consultation with advisor.
3. ****Free Electives* are to be chosen with approval of the faculty advisor in the context of an overall plan. It is recommended that students plan elective choices to include related areas of study on the College of Forestry campus, and to continue depth in subject areas offered at Syracuse University.
4. ****This elective is to be chosen in the field of humanities—usually a language course in preparation for study abroad.
5. †*Professional Electives* are to be chosen from School of Landscape Architecture course offerings or with permission of advisor from adjacent disciplines directly related to professional practice.
6. Upon successful completion of the fourth year, the Bachelor of Science degree in Environmental Studies will be awarded. A total of 127 credit hours is required for this degree.
7. Upon successful completion of the fifth year, the Bachelor of Landscape Architecture degree will be awarded. A total of 160 credit hours is required for this degree.

## PAPER SCIENCE AND ENGINEERING

Two options are offered in this curriculum—one providing a broad education in the paper sciences, and the other a similar course of study but with more emphasis on chemical engineering.

Students planning to enter as juniors must have a total of 66 credits or an Associate degree and acceptable transfer credits of 66 credits. Theses credits shall ininclude the following core courses:

| | |
|---|---|
| English | 6 credits |
| General Chemistry | 8 credits |
| Organic Chemistry | 8 credits |
| General Physics | 8 credits |
| *Mathematics | 9 credits |
| **Economics | 6 credits |
| Electives | As required |

Students will be required to complete the regular program for the junior and senior years as listed on pages 53 and 55. In order to graduate in two years students must have completed the core courses specified above prior to the junior year.

If a student desires to take more than two years to complete his Bachelor of Science degree program, deficiencies in the core courses may be completed during the regular academic year. Credit hours for core courses taken in addition to the Associate degree cannot be substituted for credit hours in either the junior or senior year. If a student has taken a course during the first two years that is considered equivalent to any of the required courses in the final two-year program at the College of Forestry, substitution of other appropriate courses can be made but the total credit hours required for graduation will *not* be reduced.

### *Paper Science Option*

This program provides basic training in the physical sciences, mathematics, and engineering, combined with a specific understanding of the chemistry and anatomy of wood, pulping of wood, chemistry and physics of paper and paper formation, and the chemical engineering of pulp and paper processing. The option permits the student a range of elective courses with a choice between the sciences or management.

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*Paper Science Option students need analytical geometry, differential and integral calculus; Paper Engineering Option students need 3 additional credits in an advanced mathematics course beyond integral calculus.

**Desirable but not necessary for the Engineering-Science graduates.

# PAPER SCIENCE & ENGINEERING CURRICULUM
## PAPER SCIENCE OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| GF 032 | Orientation | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Phys 103 | General Physics | 4 | Engl 211 | Technical Writing | 2 |
| Acct 251 | Elementary Accounting | 3 | Phys 104 | General Physics | 4 |
| F Econ 301 | Introduction to Micro-Economics | 3 | Elective | | 3 |
| | | 17 | | | 16 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 571 | Cellulose, Wood and Pulping Chemistry | 3 | Graphics 181 | Graphics I | 2 |
| Chem 346 | Physical Chemistry | 3 | Chem 332 | Quantitative Analysis | 2 |
| Chem 347 | Physical Chemistry Lab | 1 | Chem 333 | Quantitative Analysis Lab | 1 |
| PSE 300 | Introduction to the Pulp & Paper Industry | 1 | Chem 356 | Physical Chemistry | 3 |
| WPE 487 | Wood Structure & Properties | 4 | Chem 357 | Physical Chemistry Lab | 1 |
| Elective | | 3 | PSE 301 | Pulp and Paper Processes | 3 |
| | | | PSE 302 | Paper Processes Lab | 1 |
| | | | PSE 570 | Principles of Mass and Energy Balance | 3 |
| | | 15 | | | 16 |

SUMMER MILL EXPERIENCE: PSE 304: Mill Experience, 5 credit hours. Twelve weeks full-time pulp or paper mill employment approved by the Department between the junior and senior years.

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 573 | Cellulose and Wood Chemistry Lab | 1 | PSE 556 | Economics of Pulp & Paper | 3 |
| PSE 561 | Pulping Technology | 3 | PSE 566 | Paper Coating | 3 |
| PSE 565 | Paper Properties | 5 | PSE 568 | Papermaking Processes | 3 |
| PSE 571 | Pulp & Paper Unit Operations I | 3 | PSE 573 | Pulp & Paper Unit Operations II | 3 |
| Elective | | 3 | Elective | | 3 |
| Elective | | 3 | | | |
| | | 18 | | | 15 |

1. *Mathematics through Math 227 or the equivalent, is required; it is recommended that students in this option also complete Math 328.
2. A total of 135 credit hours is required in this option.

### *Paper Engineering Option*

A student may earn a chemical engineering degree in one year following the completion of this option. This program is designed to provide a basic education in the physical sciences, and mathematics, with emphasis on chemical engineering. Courses include fundamental studies in wood chemistry, wood anatomy, pulping, and the chemistry and physics of paper and paper formation.

# PAPER SCIENCE & ENGINEERING CURRICULUM
## PAPER ENGINEERING OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| GF 032 | Orientation | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Phys 103 | General Physics | 4 | Engl 211 | Technical Writing | 2 |
| Acct 251 | Elementary Accounting | 3 | Phys 104 | General Physics | 4 |
| F Econ 301 | Introduction to Micro-Economics | 3 | Elective | | 3 |
| | | 17 | | | 16 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 571 | Cellulose, Wood & Pulping Chemistry | 3 | Graphics 181 | Graphics I | 2 |
| Chem 346 | Physical Chemistry | 3 | Chem 332 | Quantitative Analysis | 2 |
| Chem 347 | Physical Chemistry Lab | 1 | Chem 333 | Quantitative Analysis Lab | 1 |
| PSE 300 | Introduction to the Pulp and Paper Industry | 1 | Chem 356 | Physical Chemistry | 3 |
| WPE 487 | Wood Structure & Properties | 4 | Chem 357 | Physical Chemistry Lab | 1 |
| Elective | | 3 | PSE 301 | Pulp and Paper Processes | 3 |
| | | | PSE 302 | Paper Processes Lab | 1 |
| | | | PSE 570 | Principles of Mass and Energy Balance | 3 |
| | | 15 | | | 16 |

SUMMER MILL EXPERIENCE: PSE 304: Mill Experience, 5 credit hours. Twelve weeks full-time pulp or paper mill employment approved by the Department between the junior and senior years.

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| PSE 561 | Pulping Technology | 3 | PSE 566 | Paper Coating | 3 |
| PSE 565 | Paper Properties | 5 | PSE 568 | Papermaking Processes | 3 |
| PSE 571 | Pulp & Paper Unit Operations I | 3 | PSE 573 | Pulp & Paper Unit Operations II | 3 |
| PSE 572 | Pulp & Paper Unit Operations Lab I | 1 | PSE 574 | Pulp & Paper Unit Operations Lab II | 3 |
| PSE 577 | Process Control for the Paper Industry | 3 | Chem Engr 351 | Chemical Engineering Thermodynamics I | 3 |
| Elective | | 3 | | | |
| | | 18 | | | 15 |

1. *Mathematics through Math 328, or the equivalent, is required; it is recommended that students in this option also complete Math 585.
2. A total of 135 credit hours is required in this option.

## RESOURCES MANAGEMENT

This is the central, accredited forestry educational program of the College. The objectives of this curriculum are (1) to provide a general and well-integrated education for professional practice as foresters and land managers, and (2) to open a broad array of natural resource-related and environmental management opportunities for the individual student to pursue his own interests and abilities in particular endeavors or through advanced study.

The core of required courses presents the principles and practices basic to sound management of extensive nonurban land areas for their many values in producing timber, wildlife, water, esthetic and recreational uses. Over a third of our nation's area is forest land. The relationships of these valuable resources to modern society's needs and to the quality of our living environment are critical and increasing in importance. The core assures fulfillment of education requirements for all initial professional positions in federal and state forestry, as well as the normal requirements of industrial and private enterprises in land management. Extensive elective courses serve to broaden the student's general education, to strengthen his perceptions and integration of knowledge, or to provide a solid base for those planning graduate study in resources management or its specialties.

The curriculum offers broad opportunity and maximum credit for students interested in transferring from liberal arts or science programs in community colleges or other universities.

Recommended program of courses for students planning to transfer as entering juniors totals 64 credits or an Associate degree and include:

| | |
|---|---|
| *Physical and Biological Sciences | 12–16 credits |
| *Mathematics | 3–9 credits |
| *Social Sciences and Humanities | 15–23 credits |
| Electives | 19–23 credits |

Attendance at a 5-week Summer Session course in Field Forestry at the Pack Demonstration Forest, Warrensburg, N.Y., is required.

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*Total credits in these areas should be 45.

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1. *Six credit hours of mathematics are required: at least algebra and trigonometry.
2. **At least one of the following three courses must be chosen from these electives: F Bot 560: Forest Pathology, Silvi 351: Meteorology and Fire Behavior, F Zool 350: Principles of Wildlife Management.
3. Two semesters of calculus are highly recommended to be taken prior to the junior year, particularly for students interested in graduate work.
4. Three elective courses (totalling 9 credits) must be selected from forestry and allied subject areas.
5. Three elective courses (totalling 9 credits) must be selected from the humanities and social science areas with at least one course from each area.
6. Additional electives should be chosen from the humanities and social science areas or from natural and physical sciences not directly related to the student's course of study.
7. A total of 137 credit hours is required in this curriculum.

# RESOURCES MANAGEMENT CURRICULUM

## Freshman Year

| *First Semester* | | *Credit Hours* |
|---|---|---|
| F Bot 100 | General Botany | 4 |
| Chem 106 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 |
| *Math | | 3 |
| Elective | | 3 |
| Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 |
| | | 17 |

| *Second Semester* | | *Credit Hours* |
|---|---|---|
| F Zool 100 | General Zoology | 4 |
| Chem 116 | General Chemistry | 3 |
| Chem 117 | General Chemistry Lab | 1 |
| Engl 102 | Freshman English | 3 |
| *Math | | 3 |
| Elective | | 3 |
| Phys Ed or ROTC | | 0 |
| | | 17 |

## Sophomore Year

| | | |
|---|---|---|
| F Bot 210 | Dendrology I | 2 |
| Gr 280 | Technical Drawing | 1 |
| F Mgt 201 | Plane Surveying | 3 |
| Phys 103 | General Physics | 4 |
| Elective | | 3 |
| Elective | | 3 |
| | | 16 |

| | | |
|---|---|---|
| F Bot 211 | Dendrology II | 1 |
| F Econ 300 | Introduction to Macro-Economics | 3 |
| Geol 105 | Introductory Geology | 3 |
| Phys 104 | General Physics | 4 |
| Elective | | 3 |
| Elective | | 3 |
| | | 17 |

SUMMER SESSION IN FIELD FORESTRY 5 weeks, 6 credit hours: Required of all students following the sophomore year and prior to registration for the junior year (including junior year transfer students who elect this curriculum).

| | | |
|---|---|---|
| F Biol 301 | Field Biology | 1 |
| F Mgt 303 | Introduction to Forest Measurements | 1 |
| Silvi 302 | Silvics | 1 |
| Res Mgt 304 | Silviculture-Resource Management | 3 |
| | | 6 |

## Junior Year

| | | |
|---|---|---|
| A M 571<br>or<br>A M 591 | Introduction to Statistical Analysis<br>Introduction to Probability and Statistics | 3 |
| F Bot 330 | Plant Physiology | 2 |
| F Econ 301 | Introduction to Micro-Economics | 3 |
| Silvi 332 | Soils | 2 |
| Silvi 333 | Soils Lab | 1 |
| Elective | | 3 |
| Elective | | 3 |
| | | 17 |

| | | |
|---|---|---|
| F Mgt 522 | Mensuration | 3 |
| F Ento 300 | Principles of Forest Entomology | 2 |
| F Mgt 340 | Harvesting | 2 |
| Silvi 521 | Principles of Silviculture | 3 |
| WPE 486 | Elementary Wood Technology | 2 |
| Elective | | 3 |
| | | 15 |

## Senior Year

| | | |
|---|---|---|
| F Econ 510 | Principles of Forestry Economics | 3 |
| F Mgt 554 | Forest Administration and Policy | 3 |
| Silvi 524 | Practices of Silviculture | 3 |
| WPE 304 | Introduction to Forest Products | 2 |
| **Electives | | 6 |
| | | 17 |

| | | |
|---|---|---|
| E 1 511<br>or<br>Silvi 540 | Principles of Outdoor Recreation<br>Principles of Watershed Management | 3 |
| F Mgt 552 | Management Planning and Operations | 3 |
| Res Mgt 502 | Resources Management or Other Forestry Elective | 3 |
| **Electives | | 6 |
| | | 15 |

## WOOD PRODUCTS ENGINEERING

Three options are available in this curriculum: Wood Science, Production Engineering, and Materials Marketing. All of these options allow two-year college students to transfer in as full juniors as outlined in the following options.

Recommended courses for students planning to enter as juniors total 64 credits or an Associate degree and are as follows: *Wood Science Option*, chemistry, physics, mathematics, and botany with credits as indicated on page 59; *Production Engineering* and *Materials Marketing Options*, chemistry, physics, mathematics, and accounting with credits as indicated on pages 61 and 63 respectively.

Students with an Associate degree will be required to complete the regular programs for the junior and senior years as listed on the above pages. In order to graduate in two years, Associate degree holders must have completed the core courses specified above or completed them in a summer session prior to the junior year. If a student desires to take more than two years to complete his Bachelor of Science degree, deficiencies in the core courses may be completed during the regular academic year. Credit hours for core courses taken in addition to the Associate degree cannot be substituted for credit hours in either the junior or senior years. If a student has taken a course during the first two years that is considered equivalent to any of the required courses in the final two-year program at the College of Forestry, substitution of other appropriate courses can be made but the total credit hours required for graduation will *not* be reduced.

### *Wood Science Option*

This option provides an opportunity for students to obtain the necessary scientific background for research and development in wood-related industries, or for graduate study leading to fundamental research and/or college teaching.

Because of the breadth of wood science, and in order to accommodate the particular needs or interests of students, two areas of emphasis are provided within the option. Those students primarily interested in the biological approach in studying wood, and in its development in the living tree, will concentrate in the anatomical or biophysical aspects of wood science. Those interested particularly in physical wood science will emphasize the basic physical sciences. In either case, at least nine credit hours of elective courses should be taken in the humanities and social sciences.

Transfer students with an Associate degree or its equivalent may enter with full junior standing if their course work includes general and organic chemistry, physics, and mathematics through topics in calculus. Any deficiencies in botany or zoology may be fulfilled later. These students can expect to graduate in four semesters.

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1. *It is recommended that at least 9 credit hours of these electives be in the social sciences or humanities.
2. A total of 131 credit hours is required in this option.

# WOOD PRODUCTS ENGINEERING CURRICULUM
## WOOD SCIENCE OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| Math 125 | Elementary Analytic Geometry | 3 | Math 226 | Differential Calculus | 3 |
| Elective | | 3 | Gr 181 | Graphics I | 2 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| Math 227 | Integral Calculus | 3 | Math 328 | Topics in Calculus | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| F Econ 290 | Introduction to Economics for Forestry | 3 | *Elective | | 3 |
| | | 16 | | | 16 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| Chem 346 | Physical Chemistry | 3 | Chem 356 | Physical Chemistry | 3 |
| WPE 322 | Mechanical Processing | 3 | WPE 526 | Fluid Treatments | 3 |
| F Bot 210 | Dendrology I | 2 | WPE 520 | Polymeric Adhesives and Coatings | 3 |
| A M 591 | Introduction to Probability and Statistics | 3 | *Electives | | 6 |
| Wood Anatomy Sub-option: | | 3 | | | |
| F Biol 330 | Principles of General Physiology | | | | |
| or | | | | | |
| Wood Physics Sub-option: | | | | | |
| A M 360 | Introduction to Computer Programming | | | | |
| WPE 487 | Wood Structure & Properties | 4 | | | |
| | | 18 | | | 15 |

WPE 390: Field Trip. 2 credit hours. A 2-week field trip at the end of the junior year.

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 522 | Composite Materials | 3 | WPE 502 | Timber Mechanics | 4 |
| Wood Anatomy Sub-option: | | 6-7 | WPE 498 | Research Problem | 3 |
| WPE 585 | Microtechnique and Photomicrography | (3) | Wood Anatomy Sub-option: | | 6 |
| Phys 261 | Introduction to Modern Physics | (3) | WPE 588 | Commercial Timbers of the World | (3) |
| Wood Physics Sub-option: | | | F Bot 585 | Plant Anatomy | (3) |
| M E 225 | Engineering Mechanics | (4) | Wood Physics Sub-option: | | |
| F Chem 556 | Polymer Properties | (3) | M E 226 | Engineering Mechanics | (3) |
| WPE 566 | Wood-Water Relationships | 3 | F Chem 520 | Nuclear Chemical Techniques | (3) |
| *Electives | | 2-3 | *Elective | | 3 |
| | | 15 | | | 16 |

### ***Production Engineering Option***

The goal of this option is to provide an education in the areas of process development, plant design, and production management of modern industries utilizing wood, its plastic and other composites, and related raw materials.

The program establishes a solid foundation in basic sciences and in applied mathematics, including computer programming and engineering statistics. On this is built a sequence of studies in engineering and management sciences essential to planning and development of production processes, and to design and operation of modern manufacturing facilities.

Modern production plants are complex systems of machines, men, money, and management, integrated for production in highly competitive markets. The graduates of this option must be familiar with planning, design, operation, and the economics of entire systems.

Transfer students with an Associate degree or its equivalent may enter with full junior standing if their course work includes general chemistry, physics and mathematics through topics in calculus.

Production Engineering students may arrange with their advisors to prepare for special course options leading to admission into a Bachelor of Science degree program at Syracuse University in either Industrial or Mechanical Engineering.

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1. *It is recommended that students elect at least 9 credit hours from the social sciences or the humanities.
2. A total of 130 credit hours is required in this option.

# WOOD PRODUCTS ENGINEERING CURRICULUM
## PRODUCTION ENGINEERING OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| Math 125 | Elementary Analytic Geometry | 3 | Math 226 | Differential Calculus | 3 |
| *Elective | | 3 | Gr 181 | Graphics I | 2 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| Acct 251 | Elementary Accounting | 3 | Acct 252 | Elementary Accounting | 3 |
| F Econ 290 | Introduction to Economics for Forestry | 3 | Engl 211 | Technical Writing | 2 |
| Engl 210 | Advanced Composition and Literature | 2 | Math 328 | Topics in Calculus | 3 |
| Math 227 | Integral Calculus | 3 | Phys 104 | General Physics | 4 |
| Phys 103 | General Physics | 4 | *Elective | | 3 |
| | | 15 | | | 15 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 322 | Mechanical Processing | 3 | WPE 502 | Timber Mechanics | 4 |
| A M 360 | Introduction to Computer Programming | 3 | WPE 520 | Polymeric Adhesives and Coatings | 3 |
| A M 591 | Introduction to Probability and Statistics | 3 | WPE 526 | Fluid Treatments | 3 |
| M E 225 | Engineering Mechanics | 4 | M E 226 | Engineering Mechanics | 3 |
| WPE 487 | Wood Structure and Properties | 4 | I E 548 | Engineering Economic Analysis | 3 |
| | | 17 | | | 16 |

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

SUMMER EXPERIENCE: 2 months experience in an approved wood products or allied firm or laboratory is required. A written report, to be presented in WPE 497, is required; usually fulfilled between the junior and senior years.

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| E E 221 | Electrical Science I | 3 | E E 222 | Electrical Science II | 3 |
| I E 575 | Industrial Methods and Systems Engineering | 3 | WPE 572 | Production Management of Wood Working Industries II | 3 |
| M E 351 | Fundamentals of Thermodynamics I | 3 | WPE 498 | Research Problem | 3 |
| WPE 570 | Production Management of Woodworking Industries I | 3 | *Electives | | 6 |
| WPE 522 | Composite Materials | 3 | | | |
| WPE 497 | Senior Seminar for Wood Products Engineering Majors | 2 | | | |
| | | 17 | | | 15 |

### *Materials Marketing Option*

The marketing of wood products, with their related materials and services, brings together the essential elements of production, distribution, and consumption of our major renewable material resource. Preparation for successful marketing involves development of basic knowledge of the materials and their properties, their efficient processing and fabrication, and the effective use of their products. Because marketing channels vary widely in nature, size and complexity to meet the equally varied needs of commercial, industrial, and consumer markets, preparation must also include the sound general business orientation required of any segment of the economy.

This option is designed to educate students for professional careers in technical sales and management of distributive enterprise in the wood products and allied industries.

Transfer students with an Associate degree or its equivalent may enter with full junior standing if their course work includes general chemistry, physics, and mathematics through analytic geometry. These students can expect to graduate in four semesters.

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1. *Those students certain of their interest in continuing in the Materials Marketing Option, should take F Econ 290 and Graphics 280 in place of F Bot 100. Those taking F Bot 100 will be required to take F Econ 290 and Graphics 280 in place of elective courses later in their program.
2. **Mathematics requirements include Math 125: Analytic Geometry and Applied Mathematics 571 or equivalents. College algebra and trigonometry may be taken in the freshman year prior to completion of these mathematics requirements in the sophomore year.
3. ***Electives are to be from the humanities or the social sciences.
4. A total of 128 credit hours is required in this option.

# WOOD PRODUCTS ENGINEERING CURRICULUM

## MATERIALS MARKETING OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| *F Bot 100 | General Botany | 4 | Pub Add 215 | Public Speaking | 3 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| **Math or Elective | | 3 | **Math or Elective | | 3 |
| ***Elective | | 3 | ***Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| Acct 251 | Elementary Accounting | 3 | Acct 252 | Elementary Accounting | 3 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| **Math or Elective | | 3 | **Math or Elective | | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| ***Elective | | 3 | ***Elective | | 3 |
| | | 15 | | | 15 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| O & M 247 | Organization and Management | 3 | Fin 355 | Money and Banking | 3 |
| WPE 322 | Mechanical Processing | 3 | WPE 520 | Polymeric Adhesives and Coatings | 3 |
| AM 360 | Introduction to Computer Programming | 3 | WPE 526 | Fluid Treatments | 3 |
| Mktg 355 | Marketing Principles, Methods, and Problems | 3 | Mktg 356 | Distribution Management | 3 |
| WPE 487 | Wood Structure and Properties | 4 | ***Elective | | 3 |
| | | 16 | | | 15 |

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

SUMMER EXPERIENCE: 2 months experience in an approved wood products or allied firm or laboratory is required. A written report, to be presented in WPE 497, is required; usually fulfilled between the junior and senior years.

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 522 | Composite Materials | 3 | WPE 544 | Materials Marketing | 3 |
| WPE 497 | Senior Seminar for Wood Products Engineering Majors | 2 | F Econ 520 | Economics of Wood-Using Industries | 3 |
| WPE 442 | Light Construction | 3 | Bus Law 357 | The Law of Contracts | 3 |
| WPE 402 | Elementary Timber Mechanics | 3 | Fin 356 | Corporation Finance | 3 |
| Bus Law 355 | Basic Concepts and Applications | 3 | ***Elective | | 3 |
| ***Elective | | 3 | | | |
| | | 17 | | | 15 |

# VI

# SUMMER SESSIONS

A wide array of courses at the undergraduate and graduate levels is available to College of Forestry students in the Syracuse University summer sessions. Research problems, thesis, and special courses regularly available at the College may be taken also during the summer sessions. Syracuse University courses taken must be related directly to the student's planned program and be approved by his faculty advisor.

*Transfer students* are advised to review their special course needs with the Office of Admissions and to consider summer session attendance where completions of background courses in mathematics, chemistry, economics, or general education subjects are necessary for fall semester entry in full standing. These courses may be taken at any accredited institution. Summer session tuition charges at the College are at the rate of 13.50 per credit ($20.00 for out-of-state residents) for undergraduate courses and $20.00 per credit for graduate courses. Information on courses to be offered, session dates, and registration procedures are available upon request from the Office of Student Services or the Office of Graduate Studies at the College.

### Summer Sessions in Field Forestry
### at the
### Charles Lathrop Pack Demonstration Forest, Warrensburg, New York

A five-week (6-credit) program of courses emphasizing the field application of forestry principles and practices is conducted in two sessions each summer at the Pack Demonstration Forest near Warrensburg, New York. These sessions are coordinated with College and Syracuse University summer sessions, permitting students to attend an on-campus session and a field session in the same summer. The courses presented in the Field Forestry program are listed in both the Forest Biology and Resources Management curriculums sections. Room, board, and fee charges approximating $160 are levied. No tuition charge is made for matriculated students since the courses in this session are coordinated with and considered an integral part of the fall semester of the junior year. *Transfer students* planning to enroll in either the Resources Management or Forest Biology curriculum should write to the Director, Summer Session in Field Forestry at the College for additional information on session dates and special requirements.

Completion of the Field Forestry program is required of students in Resources Management prior to the fall term of their junior year. Students in Forest Biology are also required to attend either this session or the session at Cranberry Lake Biological Station, although attendance at other approved biological field stations may be arranged with the Curriculum Director.

### Summer Session in Environmental Biology
### at the
### Cranberry Lake Biological Station on the Charles Lathrop Pack Experimental Forest at Cranberry Lake, New York

A summer instructional and research program in environmental biology is available with emphasis on upper and graduate level instruction in forest and fresh water ecosystems. The program is jointly conducted by the College's School of Biological Sciences and the Department of Biological Sciences at the State University of New York at Albany. The sessions are held at the College's teaching and research facilities at Barber Point which is a part of the 970-acre Pack Experimental Forest bordering Cranberry Lake. The 8-week instructional program consists of two levels of coordinated courses of 4 and 8 weeks duration. Attendance at either or both sessions may be arranged. Courses grouped by level and session are as follows:

| *Number* | *Title* | *Credits* | *Duration & Session* |
|---|---|---|---|
| | *Upper level courses* | | |
| F.Bio. 521 | Ecology of Freshwaters | 2 | 4 weeks I |
| F.Bot. 522 | Ecology of Forest Communities | 2 | 4 weeks II |
| F.Zoo. 523 | Invertebrate Ecology | 2 | 4 weeks I |
| F.Zoo. 524 | Vertebrate Ecology | 2 | 4 weeks II |
| F.Bot. 517 | Adirondack Flora | 1–2 | 4–8 weeks, I–II |
| F.Bio. 498 | Research Problem in Biology | 1–3 | 4–8 weeks, I–II |
| | *Graduate level courses* | | |
| F.Bio. 515 | Advanced Limnology | 4 | 8 weeks, I & II |
| F.Ento. 550 | Forest & Aquatic Insects | 2 | 4 weeks I |
| F.Bot. 527 | Bryoecology | 2 | 4 weeks I |
| F.Bio. 997 | Biology Seminar | TBA | 8 weeks, I & II |
| F.Bot. 798 | Research in Forest Botany | TBA | 8 weeks, I & II |
| F.Zoo. 798 | Research in Forest Zoology | TBA | 4 weeks I |
| F.Ento. 798 | Research in Forest Entomology | TBA | 4 weeks II |
| F.Bio. 722 | Bioclimatology | 2 | 4 weeks II |

Graduate level courses are offered on a regular or alternate year basis. Total credit load is limited to a maximum of 4 credits per session or a maximum of 8 credits in both sessions.

Tuition charges are $13.50 per credit for undergraduate courses and $20.00 per credit for graduate courses. Non-New York residents are charged $20.00 per credit. Forestry students register at the College for the sessions. Others register through the Albany campus. An additional charge of an estimated $200.00 for the full session or $100.00 for a 4-week session is levied for room and board. Further information on the program may be obtained by writing to Director, Cranberry Lake Biological Station, Department of Biological Sciences, State University of New York at Albany, or Associate Director, Cranberry Lake Biological Station, Department of Forest Botany at the College of Forestry.

# VII

# GRADUATE STUDY

The stimulating interaction of faculty and students working together to understand and solve today's challenging problems creates the major background for graduate study at the College. A wide array of excellent supporting facilities and equipment completes the setting for creative study. In this environment the student takes a program of advanced courses especially designed to meet his personal professional and academic objectives as a prelude to original investigation. Participation in seminars and colloquia with faculty and visiting scholars further expands his intellectual horizons. Graduate study culminates in individual research and creative achievement.

During the graduate years a student develops his ability to think critically and analytically, to design experiments and plan research, to work effectively with the basic research tools as well as with specialized equipment, and to accept the rigorous discipline of purposeful study toward a specific goal. It is a time of discovery and excitement, of answers and new insights—the realization of personal creativity and the deep satisfaction of scholarship.

The demand by industry, government, and educational organizations for scientists and scholars is increasing rapidly. Education through the doctorate is generally expected of those planning to enter college or university teaching. The Master or Doctor's degree is a requirement for many industrial or governmental research positions and increasing numbers of employers are seeking graduates with one or more advanced degrees for managerial positions. But a graduate education is more than a positional requirement. Our society is increasingly in the hands of men who have broad foresight and reasoned judgment in applying sociological and technical knowledge to guide human and environmental forces. Modern civilization requires men who can think objectively and constructively, and who can act creatively and responsibly.

## GRADUATE DEGREES

The College of Forestry offers graduate education in professional and scientific fields leading to:

Master of Science
Master of Forestry
Master of Landscape Architecture
Doctor of Philosophy (Ph.D.)

## POST-DOCTORAL OPPORTUNITIES

Advanced education and experience opportunities for professional people and scientists are abundant at the College. From 25 to 30 Post-Doctoral Fellows and Associates are in residence each year to receive advanced research experience or professional education under the guidance of faculty members with international stature. Modern facilities and instrumentation help to make the program meaningful and rewarding.

## SYRACUSE UNIVERSITY

The College of Forestry is a unit of the State University of New York. There are six major buildings located on a 12-acre campus which is immediately adjacent to the campus of Syracuse University. This mix of a State operated College and a large privately operated University Center is a stimulating environment for graduate education.

Syracuse University is one of the excellent private universities of the United States with an undergraduate study body of over 10,000 and more than 3,000 graduate students. College of Forestry graduate students may utilize any relevant courses available at Syracuse University in developing their graduate education. This gives each student the advantages of working closely with an excellent College faculty, and at the same time having access to the varied capabilities of a large University Center at his disposal.

College of Forestry graduate students have all the privileges of students of Syracuse University. They are encouraged to take advantage of all the social and cultural activities which this stimulating University Center provides.

## GRADUATE FACULTY

The faculty of the College includes 125 individuals with Professorial rank (58 Professor, 34 Associate Professor, and 33 Assistant Professor). The faculty list on pages 140–150 gives the title and academic degrees of each individual. Those who are members of the Graduate Faculty are marked with an asterisk (*).

The departmental descriptions given on pages 78–95 indicate the faculty of that department and their area of special research interest. In addition, members of College and University research centers and institutes participate in and direct graduate student programs. These include:

*Empire State Paper Research Institute:* DENCE (Organic Chemistry and Lignin Reactions); LEOPOLD (Organic Chemistry and Mechanical Properties of Fibers and Paper); LUNER (Mechanical and Surface Properties of Fibers, Films, and Paper) MARK (Fiber Physics); MARTON (Paper Properties, Microscopy, and Pulping).

*State University Water Resources Center:* HAWKINS (Hydrology); HENNIGAN (Water Management, Water Planning Administration and Policy).

*U.S. Forest Service Cooperative Recreation Research Unit:* SHAFER (Forest Recreation Research); ECHELBERGER (Forest Recreation Research); MOELLER (Forest Recreation Research).

*U.S. Forest Service Cooperative Watershed Management Research Unit:* LEONARD (Watershed Management).

## RESEARCH

Graduate education and research are so mutually dependent that they must be considered together for a realistic understanding of the College's program. Research is a major responsibility of the College required by its charter, and has been traditionally an integral part of its total academic effort.

The objectives of the College in carrying out a vigorous research program are to provide education in science and technology; to provide an environment for professional growth, the development of creative thought, and the mastery of investigative techniques; and to create new knowledge, providing a growing resource of information for the people of New York and the nation. The latter objective constitutes an obligation and responsibility of the College, as a publicly supported professional institution, relating to our great forest resources.

To support these objectives and obligations the State University of New York provides a budget for Organized Research which is currently about $750,000 annually. In addition, extra-mural research support in the form of grants and contracts amounts to over $1,000,000 annually. This extra-mural support comes from National Science Foundation, Department of Defense, National Institutes of Health, the McIntire-Stennis Program of the U.S.D.A., the U.S. Forest Service, New York Conservation Department, other government agencies, private foundations and industry.

Much graduate student research work is directly related to continuing programs of faculty research, and in many cases graduate students receive financial assistance from these programs.

Several research institutes and centers have been established at the College to promote research. These include the Empire State Paper Research Institute (supported by 49 companies in 11 countries), the Cellulose Research Institute, the State University Water Resources Center, the State University Polymer Research Center, the Applied Forestry Research Institute, the Archer and Anna Huntington Wildlife Forest Station, and the Office of International Forestry. The United States Forest Service cooperates with the College through the Cooperative Watershed Management Research Unit and the Cooperative Forest Recreation Research Unit. In each of these cooperative units Forest Service personnel are assigned to the College and work directly with the faculty and graduate students in developing research programs.

# FINANCIAL ASSISTANCE

## ASSISTANTSHIPS, FELLOWSHIPS, AND SCHOLARSHIPS

The College awards a substantial number of assistantships, fellowships, and scholarships to qualified graduate students each year. The number of students receiving these awards varies from year to year, but recently more than three quarters of all graduate students have received such support. In some cases it is not possible to provide a stipend at the start of the graduate study period, but such support is often provided after the student has demonstrated his competence.

Students may indicate their interest in a type of financial assistance on the graduate application form. Students on fellowships or assistantships must devote full-time to graduate study and are expected to register for 12 semester hours of credit each semester. Students seeking financial assistance should complete their applications before March 15 to ensure full consideration for an award.

### *College Assistantships*

Assistantships are awarded students of demonstrated scholarship whose education and experience enables them to assist in laboratory instruction and research. The amount of the assistantships is about $3,400 per year. Students on assistantships carry 12 credit hours of course work and research per semester. In addition, tuition is waived for holders of assistantships, and the student is required to pay $50 per semester in fees and assessments.

### *Special Fellowships and Assistantships*

Fellowships and assistantships sponsored by industries, associations, and foundations are available in several departments. While the amount of stipends varies, they range from $2500 to $5000 a year. Holders of these special fellowships and assistantships are required to confine the major part of their research activities to definitely specified fields. Tuition is either waived or provided by sponsors, and the student is required to pay $50 per semester in fees and assessments.

### *National Science Foundation Traineeships*

The National Science Foundation cooperates with the College in awarding Graduate Traineeships to a number of graduate students each year. Stipends range from $2400 to $2800 for a 12-month period, with an additional $500 provided for each dependent. Tuition and fees are paid by the College.

### *National Defense Education Fellowships*

Graduate fellowships are currently available under Title IV of the National Defense Education Act in most of the Departments. Stipends begin at $2400 for a 12-month period. An additional allowance of $500 is available for each dependent. Fellowship tenure is for 3 years with the stipend increasing $200 each year. These fellowships are limited to doctoral students planning college teaching careers. Tuition and fees are paid by the College. Support for these fellowships comes from the Office of Education of the United States Department of Health, Education, and Welfare.

### *Tuition Waiver Scholarships—Foreign Students*

Tuition waivers may be awarded to a limited number of foreign students judged to possess special academic capabilities and with demonstrated financial need, and who are prepared to contribute to furthering international understanding and good will. Tuition waivers also are made available on a reciprocal basis to selected foreign students in special cooperative programs maintained between certain foreign institutions and the College. The student does not receive any actual cash payment, but the tuition charge is waived. Such students are required to pay $50 per semester in fees and assessments. Requests for such tuition waivers may be made on the graduate application form.

## SCHOLAR INCENTIVE PROGRAM

Qualified New York State residents are eligible for Scholar Incentive Program grants and State University Grants-in-Aid which vary with the net taxable family income of students and the level of study, and provide substantial reductions in tuition. For details, contact the Financial Aids Officer at the College of Forestry.

## LOANS

Graduate students may be eligible for various types of educational loans. The New York Higher Education Assistance Corporation offers loans to residents which are interest free until after college, and then draw 7* per cent annual interest. Repayment terms are arranged after graduation.

A graduate student who is a U.S. citizen who needs financial assistance may borrow up to $2,500 a year under the Student Loan Program of the National Defense Education Act of 1958. No interest will accrue until 9 months after college, and part of the loan will be cancelled if the student becomes a public elementary or secondary school teacher or college teacher. A 10-year repayment period is allowed.

## OTHER FORMS OF SELF SUPPORT

Graduate students without assistantships or fellowships may be employed at an hourly rate to assist in laboratories and other College activities. Such hourly employment does not include free tuition.

Employment also may be sought on a part-time basis through the Student Services Office of the College or the Syracuse University Placement Office.

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*Effective on loans made after 4/1/69.

## TUITION AND FEES

Graduate tuition and fee charges are $317.50 per semester. A commencement fee of $25.00 is charged at the time of graduation.

## EXPENSES

Living expenses are subject to considerable variation. Many graduate students live in private homes where prices range from $8–12 per week for a single room, and from $10–15 per week or more for double room. Students are eligible to purchase meal tickets from Syracuse University (currently $660.00 per year, 34 weeks). This ticket pays for all meals except Sunday night supper. Expenses for textbooks and supplies average $100 or more a year. Personal expenses vary depending on needs and tastes.

All graduate students are required to take out a Student's Accident and Sickness Insurance Policy or its equivalent. Fellowships funded through the State University Research Foundation are required to take the health and accident insurance available through the Foundation.

## REQUIREMENTS FOR DEGREES

The College confers the degrees of Master of Science, Master of Forestry, Master of Landscape Architecture, and Doctor of Philosophy.

Graduate programs are flexible and developed individually. Each program is planned by the major professor with the student to meet his particular academic needs. Sometimes this includes undergraduate courses for which no graduate credit can be given. In every case emphasis is placed on outlining a study program leading to a high level of scholarly achievement.

An entire program for each student is usually planned during the first weeks of the academic year. It must be approved by the major professor, department chairman, and Director of Graduate Studies. The program is modified as required upon recommendation of the major professor and with approval of the Director of Graduate Studies. A thesis committee consisting of the major professor and several other faculty members is appointed early in each student's study program.

***Master*** All programs leading to the Master of Science, Master of Forestry, and Master of Landscape Architecture degrees require at least 30 semester hours of graduate credit. Graduate-level course work (passed with an average grade of at least B) takes up 12 to 24 hours. The remaining credit-hour requirement is met by submitting a thesis presenting the results of original research. Acceptance of the thesis depends on clear demonstration of ability to search and evaluate pertinent literature independently, to plan and carry through independent and important investigation, to interpret the significance of findings, and to present the subject in a well-organized, lucid, and scholarly thesis. The student must pass a final oral examination in which he defends his thesis and demonstrates his knowledge of related subject areas.

Candidates for Master degrees must spend at least two semesters in residence at the College of Forestry.

***Ph.D.*** The Doctor of Philosophy degree is conferred on students who have completed a minimum of 90 semester hours of graduate level credit with an average grade of at least B. A student holding a Master's degree may be allowed up to 30 hours of credit toward the 90 required for the doctorate. The doctoral thesis is evaluated at between 30 and 45 hours of graduate credit. The student must pass a comprehensive examination covering his field in depth and, in a somewhat broader manner, allied fields, before being admitted to candidacy for the doctorate. He must also pass a final oral examination in defense of his thesis and also covering his major and minor fields of study.

Quality of work is especially emphasized for the Doctor of Philosophy degree. The student is required to penetrate the frontier of knowledge in his particular field and make a definite contribution to this knowledge. He is required to demonstrate original scholarship of a high order in his search and evaluation of literature, in the planning, execution, and interpretation of his own research, and in the presentation of his findings in a thesis. Subsequent publication in a scholarly journal is expected.

There is no College-wide language requirement. However, competence in a foreign language, statistics, computer programming, or other "tools" may be required where they are relevant to the students field of study.

A candidate for the Ph.D. degree with only a Bachelor degree must be in residence for at least two full academic years. A candidate having a Master's degree must be in residence for at least one full academic year.

## ADMISSION REQUIREMENTS

Admittance to graduate study will be granted only to applicants with at least a Bachelor's degree from a recognized institution, whose preparation has been suitable in quality and content for the proposed field of major study. Applicants will be evaluated on the basis of the following: (1) their academic record should show approximately a "B" or 80% average for the junior and senior years; (2) Graduate Record Examination Aptitude scores and in some cases, subject matter tests indicative of graduate study ability; (3) supporting letters of recommendation, and (4) where appropriate other evidence of scholarly achievement and potential. Priority in admission is given applicants who have high scholastic standing.

All applicants are required to submit Graduate Record Examination aptitude scores and subject matter (advanced) test scores when applicable in their subject area with their graduate application. In some instances GRE scores may not be required for applicants who have completed a Master degree; however, these scores are often essential in award of financial assistance. This examination is offered several times per year in major cities of the world. For information on registration and scheduling write to the Educational Testing Service, Princeton, New Jersey 08540. In submitting test scores request that they be sent to the Director of Graduate Studies, State University College of Forestry, Syracuse, New York 13210 (Institutional number R2530).

The College provides a special form for application for graduate work. Requests for information and applications should be addressed to the Director of Graduate Studies, State University College of Forestry, Syracuse, New York 13210.

Under special conditions and on recommendations of the department chairman concerned, students may be admitted at the discretion of the Graduate Committee and carried on a non-degree status. Non-degree students accepted for special study programs may be regarded as visitors and normal graduate standards need not apply.

## ACADEMIC REQUIREMENTS

Graduate students are required to maintain a B average as a minimum. Students whose cumulative grade point average falls below "B" at the end of any semester are placed on probation for the following semester. A student placed on probational status must qualify for full standing by the end of that semester or be subject to dismissal from graduate study.

## INTERNATIONAL STUDENTS

Citizens of other countries with special educational objectives are accepted for graduate study in all programs. They must show satisfactory evidence that they have completed studies in their major field equivalent to those at a recognized American institution with a scholastic record equivalent to a B average in their junior and senior years. They must submit Graduate Record Examination scores as explained in the section on Admission Requirements. Also, applicants whose native language is other than English must submit scores on the Test of English as a Foreign Language (TOEFL) as an indication of their ability with the English language. This examination is offered several times per year in major cities of the world. For information on registration and scheduling write to the Educational Testing Service, Princeton, New Jersey 08540, U.S.A. In submitting test scores, request that they be sent to the Director of Graduate Studies, State University College of Forestry, Syracuse, New York 13210. See the section on scholarships for information on tuition waivers in special cases for foreign students.

International students who have completed a Bachelor or Master's degree at an American college may be admitted as graduate students. They must apply for admission as explained in the section on Admission Requirements. In this case the requirement of TOEFL scores may be waived. Students currently enrolled in an American college must obtain permission to transfer from the U.S. Immigration and Naturalization Service district office having jurisdiction over the college in which the student is currently enrolled.

## HOUSING

The College of Forestery does not operate dormitories or student residences. These are facilities of Syracuse University. Married students are certified to the Syracuse University Married Students' Housing Office, through which the University operates rental dwelling units for families with and without children. Veterans of the Armed Forces of the United States and her allies are given priority. Married students who wish to live in University housing should write to the Director, Married Student Housing, 1528 East Colvin Street, Syracuse, New York 13210.

## EXCHANGE OF GRADUATE STUDENTS

Formally admitted degree graduate students in any unit of the State University of New York may be authorized to take courses at the State University College of Forestry at Syracuse University without going through the usual application and admission procedures. Such exchange students must have the necessary prerequisites for the course, or permission by the instructor, and there must be available room in the course. These matters will be decided by the Professor and Department Chairman or School Director involved and handled through the Director of Graduate Studies.

To be admitted as an exchange student will require a statement from the student's Department Chairman indicating the course (or courses) involved, and that the course (or courses) will be accepted toward completion of his degree requirements. Whenever feasible the student will pay appropriate tuition and fees for the course(s) at his institution. If the student has a waiver of tuition at his institution, that waiver (tuition receipt) will be recognized at the College of Forestry. This authorization will apply *only* to College of Forestry courses, not to Syracuse University courses.

## GRADUATE PROGRAMS

Graduate education may be pursued at the College in any of the departments or programs listed below. Also there are wide opportunities for interdepartmental and interdisciplinary programs since the faculty of the departments cooperate in executing research, in planning graduate programs, and in teaching courses. Interested students should review the descriptions of all programs related to their field of interest to get a clear picture of the wide range of graduate education available within the College. In addition, they should keep in mind that the great variety of course offerings at Syracuse University and the State University Upstate Medical Center are also available. This arrangement means that graduate students at the College work intimately with a distinguished faculty, in a small campus environment, and yet have all of the educational and social advantages of a large university complex at their disposal.

The descriptions which follow should be reviewed in relation to the following administrative divisions:

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## FORESTRY ECONOMICS

Duerr, *Chairman* (Managerial Economics, Resource and Market Analysis); Armstrong (Industry Economics, Resource and Market Analysis); Bennett (Economic Theory, Economic Thought in Forestry); Christiansen (Forest Production Economics, Economic Systems Analysis); Miller (Regional Economics, Economics of Consumption); Petriceks (Macro-Economics, International Forestry Economics):

Graduate study emphasizing the economic aspects of forestry is offered by the Department in programs leading to Master and Doctor degrees. The Master's programs are designed to meet the needs of the graduate in forestry or forest products. They also serve the graduate in liberal arts, engineering or business whose interests point toward the economics of forest resource management. The aim is primarily to broaden the student's understanding of the content of forestry economics.

The Doctoral program is for those who wish to make a career as professional forestry economists in research institutions, in the academic world, or in business or government. The goals are depth of understanding and familiarity with economic tools contributory to making competent decisions in resource economics, management and policy. Requirements are in general the same as those observed in economics departments of leading universities, except that the student completes specified work in the economics of forestry.

Whatever the program, the basic purpose is to help the student acquire the tools and facility for disciplined, logical, critical and constructive thinking and for clear expression in this field.

Instruction at the College of Forestry is supplemented by the wide range of courses available in the Maxwell Graduate School of Citizenship and Public Affairs, the College of Business Administration, and other units of Syracuse University. Individual programs may include supporting courses in general economics, mathematics and statistics, operations research, business, international affairs and other social sciences and related fields. The substantial library resources, computer facilities and other resources of Syracuse University also supplement those of the College.

Graduate research within the Department covers a broad spectrum. Examples of topics recently treated are: application of economic systems and operations research in timber management and in the manufacture and marketing of forest products; forestry investments in the face of uncertainty; economic models for public forestry decision-making; history of economic thought in forestry, the financing of public recreational improvements; and forestry investment criteria in newly-developing nations.

## FOREST MANAGEMENT

GETTY, *Chairman* (Forest Policy, Administration, Managerial Processes); BICKFORD (Statistics, Inventory and Research Design); BROCK (Analytical and Interpretive Photogrammetry); CUNIA (Operations Research, Mensuration); GRAVES (Resources Planning and Management, Man-Resource Relations); HAWKINS (Hydrology); HORN (Business Management, Law and Legal Aspects); KOTEN (Management Analysis, Forest Engineering); KASILE (Statistics, Experimental Design); LANCKTON (Remote Sensing, Photogrammetry); LEE (Director of College Computer Center, Systems Analysis and Engineering); MORRISON (Sociology of Outdoor Recreation); PALMER (Industrial Engineering and Management); SHAFER (Forest Recreation Research); STANTON

(Photogrammetry, Geodesy); TULLY (Structural Design, Hydrology, Soil Mechanics); WENGER (Recreation, Research Methods):

The graduate program in the Department offers wide opportunity for either specialization or breadth in advanced study. The faculty foster a spirit of individual initiative and free inquiry into all aspects of managerial concerns. Joint programs are common, aiming at strength and balance with relevant knowledge offered in other departments and disciplines. Graduates from various fields of study are encouraged to apply. Five major areas of concentration outlined below permit a student to prepare himself in considerable depth, but flexibility, integration, and broader understanding also are encouraged.

A *Management* program prepares graduates for the field of administration or management in a public agency or a business concerned with natural resources or environmental quality at the executive, planning, budgeting, programming, operating, or leadership levels. The wide choices of courses in other departments of the College and in the many Colleges of Syracuse University, including the renowned Maxwell Graduate School of Citizenship and Public Affairs and the College of Business Administration, are used to supplement the Department's offerings. This enables the student to earn a Master's degree which is the forestry or natural resources equivalent of a Master of Business Administration or Master of Public Administration degree. The Ph.D. program is scientifically oriented and strongly supported by courses in the behavioral sciences to develop the talents needed in top executive leadership in the rapidly developing fields of man-resources relationships, environmental quality, and management sciences. Interested graduates from business and other colleges are encouraged.

Forest *Mensuration* and *Biometrics* is a more concentrated program that offers highly sophisticated courses in mensuration and operations research, as well as all phases of statistics and statistical design, leading to the Master and Doctor degrees. The course work and research, directed by internationally known specialists in forest mensuration and statistics, constitute an exceptionally strong program.

A third program emphasizes *Photogrammetry,* either as a specialization or in conjunction with management. Individually designed Master or Doctor programs are available in Analytical Photogrammetry, Photogrammetric Systems, and Photo Interpretation and Remote Sensing. Graduates with Bachelor of Science degrees in forestry or in engineering, geology, physics, or mathematics readily qualify for graduate study in Photogrammetry.

Forest *Recreation* is a fourth major program of graduate study and research offered by the Forest Management Department. Either specialized inquiry or complex synthesis and insight may be pursued, for which elective support may be drawn from other departments such as Landscape Architecture, Economics, Silviculture, and Zoology. Syracuse University courses in sociology, psychology, philosophy, journalism, physical education and related fields offer strong support for the student preparing seriously for Recreation. Of special significance is the Recreation Research Branch of the Northeastern Forest Experiment Station of the U. S. Forest Service located at the College of Forestry. Its Director and several professional recreation researchers in residence at the College serve as adjunct faculty in the Forest Management Department. Both Master and Ph.D. candidates are presently matriculated in this program. There is great employment opportunity for many more people with advanced degrees in this field. Interested graduates with a Bachelor of Science degree in rural sociology, psychology, urban planning, political science, business or public administration qualify for this program by including sufficient forestry study in their graduate program to provide a natural-resources background.

The *Forest Engineering* program in the Department is articulated closely with course offerings of the Civil Engineering Department and the Industrial Engineering Department of Syracuse University. This Master's program offers a unique opportunity for graduates with a Bachelor of Science degree in Forestry to obtain advanced preparation in the engineering components of resources management, and environmental management based on the fundamentals of civil and industrial engineering, systems analysis, computer science, and management science. The diverse resources of the College and the State University Water Resources Center support graduate programs wherever appropriate.

## SILVICULTURE

FARNSWORTH, *Chairman* (Silviculture); BERGLUND (Silvics); BLACK (Watershed Management); CRAUL (Forest Soil Physics); ESCHNER (Forest Influences); HERRINGTON (Meteorology); JOHNSON (Silviculture); LEA (Director, Summer Field Session, and Silviculture); LEAF (Forest Soils Fertility); LEONARD (Watershed Management); MINKLER (Hardwood Silviculture); RICHARDS (Reforestation):

Graduate study in all aspects of silviculture and its supporting sciences is available. Emphasis can be placed on fundamental biological relationships or on applications of these relationships in the forest environment. Programs are coordinated with other areas of specialization through cooperation between the Department, other departments of the College, Syracuse University, the State University Water Resources Center, and the U. S. Forest Service Watershed Management Research Unit. A major strength is the close association of scientists representing a broad spectrum of specialists, stimulating intra- and interdisciplinary cooperation.

Graduate emphasis may be directed to silvics, silviculture, forest stand development, forest influences and watershed management, forest tree genetics and tree improvement, forest meteorology and climatology, forest soil physics and forest

soil fertility-nutrition, and site relations. Concern for the forest ecosystem provides a major focus for the work of the Department. Translation of these concerns to broader questions of environmental quality is given attention. Well-equipped laboratories, specialized equipment and greenhouse facilities are available to graduate students.

Extensive College forests of nearly 22,000 acres include most forest types of the northeast, as well as plantations, seed orchards, and a tree nursery, all of which offer exceptional opportunities for field study under a wide variety of environments. Major field installations include long-term northern hardwood stand improvement studies, the oldest continuously studied forest fertilization trials in the United States, and two large micro-climatic tower complexes with associated automated data acquisition systems and instrumentation.

## FOREST BOTANY AND PATHOLOGY

Tepper, *Chairman* (Anatomy and Morphogenesis); Griffin (Mycology and Fungus Physiology); Ketchledge (Ecology and Bryology); Lowe (Mycology); Manion (Pathology); McDowell (Fungus Physiology); Morrison (Taxonomy); Schaedle (Physiology); Silverborg (Pathology); Valentine (Genetics); Wang (Mycology); Wilcox (Physiology of Growth and Development); Zabel (Wood Deterioration).

The program in botany and pathology is designed to provide students with a course of instruction in basic botanical and related natural and physical sciences. Research and thesis problems are generally designed to utilize forest organisms in the development of biological knowledge. Graduate programs are offered in the fields of anatomy, morphogenesis, physiology, ecology, forest pathology, wood deterioration, mycology, genetics and taxonomy. Minors may be taken as soils, wood chemistry, and biochemistry. Strong supporting courses in bacteriology, botany, microbiology, genetics, mathematics, chemistry and statistics, available at Syracuse University, provide additional courses for graduate programs.

Students interested in programs of study directed toward broad biological applications or resource ecology (i.e., environmental biology, tree pest control, conservation ecology, etc.) may elect to take a Master of Forestry degree to achieve these aims.

Current areas of active research by departmental faculty are: *Anatomy and morphogenesis,* factors that influence the development and form of root systems and regulate the development of root and shoot apices, cell differentiation in tissue culture; *physiology,* chemical regulation of organ growth, the nature and physiology of mycorrhizae, ion transport, mineral nutrition, biochemical aspects of cambial physiology; photosynthesis; *ecology,* dynamics of plant communities in the Adirondack Mountain Region and on the Alleghany Plateau, the influence of man on plant communities, the interaction of environmental factors during vegetational change, and chemical ecology; *forest pathology,* diseases of forest plantations, heart-rots and cankers, tree rusts and physiogenic diseases; *wood deterioration,* the effects of stains and decays on wood use and their controls, the chemistry of wood decay, toxicity mechanisms, and the bioassay of toxicants; *mycology,* the taxonomy, sexuality, and morphology principally of wood-inhabiting fungi and microfungi; *fungus physiology,* the role of nucleic acids and intermediary metabolism in growth and morphogenesis; *genetics,* quantitative and population genetics, the heritability and natural variations in wood characteristics that are important in forest products and wood pulp; *taxonomy,* the identification, nomenclature and classification principally of fungi, bryophytes and vascular plants.

Illick Hall, the new biological science building, provides faculty and students with modern facilities for botanical research. Special facilities include roof-top greenhouses; growth chambers; herbaria and special research laboratories for tissue culture, microchemistry, microtechnique, microscopy, radiochemistry, chromatography, and computation. In addition a cobalt-60 source, electron microscopy laboratory and a computer center are available at the College for student use. Extensive College forests, including most forest types of the Northeast, plantations and nurseries offer exceptional opportunities for field study of forest plants and diseases.

Research in the department is supported by private industry, the United States Forest Service, the Conservation Department, the Research Foundation of the State of New York, a variety of Federal agencies and by the State. In addition to direct project support, the grantees also provide for graduate research assistantships.

## FOREST ENTOMOLOGY

Simeone, *Chairman* (Ecology and Wood-Inhabiting Insects); Allen (Ecology and Population Dynamics); Brezner (Physiology); Kurczewski (Morphology, Taxonomy, Behavior); Nakatsugawa (Toxicology):

Broad opportunities for study in forest entomology are available for the graduate student who, with the advice of his major professor, is permitted to follow a program of research supplemented by appropriate course work at this College and at Syracuse University. On-going research includes not only classical studies on the biology of forest insects and those causing the deterioration of wood, but a wide variety of possibilities such as host-parasite relationships, host selectivity, insect physiology, dehydrogenases, mechanisms and enzymology of insecticide detoxification, biochemical systematics, comparative behavior, taxonomy, histology and cytology. Selected problems may also concern chemical, biological, and silvicultural aspects of insect control.

Informal interdisciplinary pursuits are possible in chemical ecology, genetics, forest pathology, immunology and climatology involving other departments at this College and Syracuse University. Areas of specialization are enhanced by supporting courses in these other disciplines. Students interested in insect ecology, chemical ecology, physiology or taxonomy, for example, may pursue these subjects relative to plants and other animals by selecting courses in forest botany, silviculture, forest zoology and biochemistry.

Students and faculty have a wide range of field and laboratory facilities available for research. The several forest properties represent varied forest environments while Illick Hall provides modern controlled facilities and instrumentation. More than 18,000 square feet of indoor space is available, with access to electron microscopy laboratory, environmental chambers, ultra centrifuges, nuclear magnetic resonance equipment, gas chromatograph, isotope laboratory, cobalt source for irradiation, a sound-proof room, glasshouse, and an insectary complex affording subjection of insects to controlled as well as ambient weather conditions. The taxonomic museum houses nearly 100,000 insects species deposited by entomologists for more than half a century. A computer center provides services in all phases of entomological research.

## FOREST ZOOLOGY

Alexander, *Chairman* (Vertebrate Ecology); Behrend (Forest Wildlife Biology and Management); Brocke (Bioenergetics and Wildlife Biology); Chambers (Poplulation Ecology and Wildlife Management); Dindal (Invertebrate Ecology); Graves (Vertebrate Physiology); Hartenstein (Invertebrate Physiology); Price (Animal Behavior); Webb (Vertebrate Ecology and Forest Wildlife Management).

Graduate studies in forest zoology include both basic and applied research on animals of the forest ecosystem, including its associated soils, water and related wildland areas. Programs are offered in vertebrate ecology, soil invertebrate ecology, endocrinology and physiology, population ecology, animal behavior, forest wildlife biology, aquatic ecology, and forest wildlife management.

The Department and its laboratory facilities are located in a new biological sciences building. They include specialized laboratories for research in physiology, soil invertebrate ecology, animal behavior, aquatic biology and wildlife biology. An extensive collection of invertebrates is available, as well as the large Roosevelt Wildlife Collection. Various temperature-humidity chambers are available, including an environmental simulating chamber which programs and records light, temperature, humidity, altitude, wind, and precipitation.

The Department has an intensive research program in wildlife biology, open to graduate students on the Archer and Anna Huntington Wildlife Forest Station, a 15,000-acre forest in the Central Adirondack Mountain region. Many forest types are present in varying stages of management. Four faculty members are year-around residents on the area. A new laboratory building is available.

Field research can also be conducted on the College's Heiberg Memorial Forest and Experiment Station. Several other areas are located within a 35-mile radius of Syracuse, and frequently are used for research purposes. These include Onondaga County's Highland Forest and Carpenter Creek Fish Hatchery; the State Conservation Department's game management areas—Tioughnioga, Three Rivers, Howland Island, and Cicero; the Montezuma National Wildlife Refuge; and privately-owned lands.

These facilities and areas are supplemented by the services and facilities of the College's other departments, particularly the Departments of Forest Botany and Pathology and Forest Entomology. The Departments of Forest Management and Silviculture provide support in relating the managerial and silvicultural facets of forest resources to wildlife biology study programs. The College is adjacent to Syracuse University with its large Department of Zoology, strong in physiology and developmental zoology. Available through this institution are programs in social sciences and engineering, including land use and environmental pollution.

The Upstate Medical Center of State University of New York also is nearby. Its facilities are available for graduate students whose research can be benefited by their specialized library, equipment, and faculty.

Examples of recent research include the ecology of forest wildlife species, movements of larval fish, domestication of Norway rats and pheasants, marsh ecology, hematology of woodchucks and game birds, wetland planning, nesting behavior, deer behavior, physiology of isopods, pesticides and soil fauna, physiology of hibernation, and the population dynamics of wild animals.

## FOREST CHEMISTRY (POLYMERS, NATURAL PRODUCTS, BIOCHEMISTRY)

SCHUERCH, *Chairman* (Wood and Polymer Chemistry); BAUM (Biochemistry and Microbiology); JAHN (Forest and Wood Chemistry); LA LONDE (Organic and Natural Products Chemistry); SILVERSTEIN (Ecological Chemistry); SMID (Physical and Polymer Chemistry); SMITH (Physical and Polymer Chemistry); SONDHEIMER (Biochemistry); SZWARC (Physical and Polymer Chemistry); TIMELL (Carbohydrate and Wood Chemistry); WALTON (Biochemistry).

Recent years have seen profound advances in the fundamental knowledge of chemical areas which have special significance to forestry. Therefore, this department is very active in the following research areas: polymer chemistry, wood chemistry, biochemistry, chemistry of natural products including ecological chemistry, and organic material sciences.

Requirements for a Master of Science or Doctor of Philosophy degree in chemistry include a research project and thesis, along with an appropriate program of courses at the College and at Syracuse University. Generous financial support is available in the form of fellowships, teaching assistantships, and tuition waivers to qualified foreign students and to postdoctorates.

Specific projects may vary from year to year, since they reflect the current interests of the department members. Current research projects with physiochemical emphasis are: the chemistry, solid state, and solution properties of natural and synthetic polymers; chemistry of free radicals, radical ions and charge-transfer processes; crystal structure and morphology of cell wall constituents. Current organic chemistry programs deal with synthesis of special polymers such as high temperature aromatic block, stereoregular vinyl polymers, and polysaccharides, various aspects of alkaloid chemistry, isolation and characterization of insect and mammalian attractants, and the chemistry of compounds having strained bonds. An active program on the structure and degradation of the polymeric wood components, hemicelluloses, lignins and celluloses, is underway. In biochemistry, department members are studying: mechanisms of action of plant growth hormones, biochemical regulation of seed germination, plant enzymology, chemistry and biochemistry of plant phenols, and structure and metabolism of terpenoids in higher plants and microorganisms.

Graduate research laboratories in the Hugh P. Baker Laboratory are well equipped for polymer studies, chemical and biochemical research. Instrumentation includes analytical and preparative ultracentrifuges, Warburg respirometer, recording infrared and ultraviolet spectrophotometers, mass spectrometer, differential refractometer, electron spin resonance spectrometer, nuclear magnetic resonance spectrometer with spin decoupler, recording polarimeter and optical rotatory dispersion spectrometer, electron microscope, X-ray diffraction, chromatography and cold laboratories, and radiochemical laboratories with counters for solids, liquids and gases.

## PAPER SCIENCE AND ENGINEERING

O'NEIL, *Chairman* (Pulping, Bleaching and Paper Properties); GORBATSEVICH (Pulping, Bleaching, Paper Technology, and Paper Properties); STENUF (Chemical Engineering, Instrumentation, Thermodynamics, Process Control, Metallurgy and Corrosion); STRAUSS (Paper Properties, Paper Coating, Pulping, and Bleaching).

The pulp and paper industry is one of the most rapid in rate of growth among all major American industries and is fifth largest in the nation. The need for professional men with advanced education in science, engineering and technology is increasing at a rate more rapid than the growth of the industry. The College pioneered in providing graduate study in this area in 1920 with the organization of the Department of Paper Science and Engineering.

Since its inception, the Department has maintained a singularly high position in professional education in providing personnel for the continuing development of the pulp, paper, and allied industries. Its graduates, who are in constant demand, are located throughout the world.

The graduate program reflects the strong trend toward diversification in the industry and offers opportunities for obtaining Master of Science and Doctor of Philosophy degrees in a variety of subjects related to the manufacture of pulp and paper. Advanced courses are offered in such diverse areas as engineering, physical and organic chemistry, polymer chemistry, paper physics, and fiber morphology.

Major research areas in the Department are: physics and chemistry of pulping and bleaching; physical properties of fibers; characteristics of the paper web; chemical engineering operations as related to the pulping and papermaking processes; utilization of new raw materials; flow properties of papermaking materials.

The new Walters Hall, opened in 1969, is devoted exclusively to education and research in this field. It contains a large number of research and special purpose laboratories which house sophisticated equipment. This new facility will enhance the existing graduate program.

The research program is designed to generate new information regarding the fundamentals, the science, the engineering and the technology of the papermaking process as a contribution towards progress and the future development of the industry. These efforts are made possible by the use of advanced techniques such as electron microscopy, specialized spectrophotometry, nuclear magnetic and electron spin resonance and nuclear tracer techniques, all within the framework of one of the outstanding research facilities in the field. Also included is a modern chemical engineering laboratory designed for studies in all phases of unit operations, processes, process control and thermodynamics.

The Department maintains an experimental pulp and paper mill equipped with machinery and instrumentation for studies in many facets relating to this industry. These studies include pulping, pulp purification, refining, investigations of paper additives, and papermaking. This facility includes a paper machine, a 400 horsepower double disk refiner, a two-pocket grinder for mechanical pulping and auxiliary equipment.

Recent research has been directed to fundamental studies of pulping, bleaching, additives, the papermaking process, reactions of wood components during mechanical and chemical treatments, evaporation, fluid dynamics, heat transfer, the structure of wood and wood fibers.

## WOOD PRODUCTS ENGINEERING

ANDERSON, *Chairman* (Wood Quality-Growth Relations); CÔTÉ (Cellular Ultrastructure); DAVIDSON (Organic Materials Science); DE ZEEUW (Wood Anatomy, Structure-Property Relations); MEYER (Wood-Polymer Systems, Radio Isotope Techniques); MOORE (Bonded Materials Technology); PENTONEY (Mechanical Behavior, and Fracture Mechanics); SIAU (Protective Treatments, Transport Processes); SKAAR (Wood Physics); G. SMITH (Materials Marketing); WHITT (Industrial Engineering).

Graduate study is in wood science, wood technology, production engineering in the wood products industries, and wood products distribution. The principal objectives are to develop originality and the analytical approach to problem solving. The student may emphasize appropriate phases, including the mechanical properties of wood, structure and anatomy of wood, cellular ultrastructure, quality of wood, processing of wood into various forms and products, industrial management of wood manufacturing plants, distribution of wood products, organic materials science, physical chemistry of wood treatments, fluid treatments and wood physics.

Research problems are selected after faculty-student consultation. Typical problem areas include variations in wood structure caused by ecological factors; ultrastructure of cell walls; preservative treatments for insect, fire, and decay resistance; protective or esthetic coatings; machining variables; bonded materials technology; mechanical and physical properties of wood and structure-property interaction of polymeric materials; composite material properties and design; chemical enhancement of wood; problems of the distribution enterprise for lumber and manufactured products and production engineering in wood products manufacture.

Modern laboratories and instrumentation are available for advanced research. There is a close liaison with specialists in other disciplines concerned with wood research so that interdisciplinary approaches to problems are possible. Syracuse University course offerings, especially in the College of Engineering, are available to supplement those of the College in planning graduate study programs.

Undergraduate backgrounds required for the diversified programs in the Department depend upon the student's interests in his graduate study. He may have majored in the Natural Sciences, Forestry, Wood Science, Wood Technology, Engineering, or certain of the social sciences, such as Economics or Business Administration. Programs of graduate study in Wood Products Engineering may be built on any of these foundations.

Special study and research opportunities exist in the wood-using industries. Close cooperation is maintained with these industries by the College. The large volume and variety of wood products processed within New York State creates a favorable climate for graduate study in this field.

## SCHOOL OF LANDSCAPE ARCHITECTURE

SEARS, *Director* (Natural Area Studies); EARLE (Art, History of Environmental Development); VIERTEL (Plant Materials, Computer Graphics); REIMANN (Methods and Philosophy of Design).

The School of Landscape Architecture is unique in its location in a College of Forestry, whose campus is immediately adjacent to Syracuse University. This provides for a strong base in ecology, the natural sciences, resources management, recreation, and for development of a diversity of landscape architectural programs interrelated with architecture, planning, urban studies, and the social and behavioral sciences.

Students with undergraduate degrees in landscape architecture may choose to further develop skills in the landscape design process and apply them to the study of more complex environmental problems or to areas of special interest. They may also choose to focus mainly on parametal areas of interest such as identified above, with a view toward expanding their background in environmental concerns. Those whose undergraduate work has been in other areas are invited to focus directly on landscape architectural studies or to develop potential relationships between their prior disciplines and the profession of landscape architecture.

Consistent with the wide-ranging environmental philosophy of the School, graduate programs are developed to enhance each student's background, capability, and intentions. The general format is not highly structured but more individually oriented in three broad areas. These include course work in landscape architectural studies; in areas designated as directly pertinent to a particular program intention; and in elective areas to serve more general and widespread educational interests.

Research at the School, both sponsored and independent, centers on man-environmental relationships, particularly those of a current, critical nature. Graduate programs also usually include some investigative research in one of these areas, culminating in the preparation of a thesis.

The combination of the College library and the several libraries on the University campus offer excellent in-depth reference material to support study programs. Facilities at the School are extensive and include drafting, reproduction, model making, recording, photographic and projection equipment. The College maintains a computer center which is used primarily for instruction and research and is available for individual use by graduate students.

The curriculum of the School includes a semester of study in a foreign location as a regular part of its undergraduate program. The location for this semester of study varies at two- to three-year intervals and is conducted in conjunction with the State University Office of International Studies and World Affairs. This portion of the curriculum is presently developed in association with the University of San Carlos and has its facilities in Antigua and Guatemala City, Guatemala. Graduate students are encouraged to fully utilize this unique feature as a resource for advanced study in particular environments or in studies of cultural and environmental relationships.

Outstanding professionals periodically visit the School to discuss their special interests and to serve as critics and lecturers to the various programs. In addition, the School, through its faculty and alumni, maintains contact with a great many landscape architectural firms, planning agencies, park systems, and governmental organizations throughout the country.

The Syracuse area has the largest concentration of landscape architectural firms in the State, outside of New York City. With a metropolitan population of nearly three quarters of a million, the city has many progressive, urban-oriented studies and projects in process. Also, its central location is most favorable for access to other urban areas. New York State, with its large population base, has a rich variety of recreation areas administered by diverse governmental agencies and private owners. These vary from vest pocket parks in urban areas to the 2 million-acre Adirondack Preserve, and thus offer an ideal opportunity for study and research at many levels.

The profession of landscape architecture is experiencing its most rapid expansion in history. Its scope is increasing geometrically as man's concern for his environment grows. The opportunity to use additional training to better understand and satisfy the changing relationships of man and his environment and to fill a desperate need for landscape architects in education, in private practice, and in public service promises a rewarding career.

## INTERDEPARTMENTAL AND MAJOR INTERDISCIPLINARY PROGRAMS

Interdisciplinary graduate study programs at the College are both of an informal and formal nature.

Informal programs are of long tradition and permit students to select thesis topics and develop programs from a broad spectrum of professional and science topics in forestry, forest products, the physical and biological sciences, engineering, and landscape architecture involving the supporting resources of several departments. These informal interdisciplinary programs are achieved readily through flexible degree requirements and the assignment of thesis committee members representing the key supporting areas.

Other programs suggestive of the range of topics available to students in the informal interdisciplinary approach are subjects involving the biological sciences and biochemistry; paper science, engineering, and plastics; wood products engineering, wood science, and polymer chemistry; silviculture and the botanical sciences; tree improvement and genetics; and wildlife biology and resources management. Though considerable breadth and flexibility are achieved in these informal interdisciplinary graduate study programs, students are still required to meet in full the degree requirements of their major department.

Formal interdisciplinary programs leading to Master and Doctor of Philosophy degrees are available in the areas of *World Forestry, Water Resources,* and *Organic Materials Sciences.* These three programs are designed to permit greater supporting subject breadth and topic focus than is available in the departmentally based informal interdisciplinary programs. These formal interdisciplinary programs are described below:

### *World Forestry*

Program Leader—CHARLES C. LARSON, Professor of World Forestry and Director of the Office of International Forestry.

Graduate study and related research in world forestry is a College-wide activity supported by faculty representing the major areas of professional faculty specialization and broad backgrounds of foreign forestry experience. The non-technical elements of the program are supported by a wide variety of course offerings in the Maxwell Graduate School of Citizenship and Public Affairs, the Department of Geography and other departments of Syracuse University. Opportunities for field training and research in tropical forestry and related fields are available to qualified participants in this program, under cooperative agreements maintained by the College with the University of the Andes, at Merida, Venezuela, and the Institute of Tropical Forestry of the U.S. Forest Service, at Rio Piedras, Puerto Rico. The College also participates in the program of the Organization for Tropical Studies which provides opportunities for advanced study and research in tropical forestry and related fields for selected graduate students.

Graduate study in this field is aimed at supplementing and enriching the student's technical forestry knowledge and providing the broad background deemed necessary for effective service in foreign forestry. This includes service as forestry advisor, teacher and research specialist with national and international agencies, private business and industrial firms, philanthropic foundations and voluntary service organizations whose activities include the development and/ or use of forest resources in other lands.

At the Master's level, program emphasis is on the attainment of general competence in foreign language, cultural anthropology, world geography, history, and international affairs, plus a broad understanding of the world forestry situation. While the candidate is urged to devote major effort to formal course work, a thesis is required to provide a creative experience in critical study and original thinking. Sufficient flexibility is maintained to enable the student to focus his studies on some aspect of world forestry either global, regional or national in scope.

At the doctoral level, program concentration is on a specialized discipline area such as forest botany, forestry economics, forest management, silviculture, or wood products engineering. Orientation to the world forestry field in this case is achieved in part through the selection of formal course work, and in part through providing an opportunity for the student to conduct his thesis research in residence abroad. Major program emphasis is placed on a thesis representing a significant contribution in original study in a world forestry problem area.

### *Water Resources*

Program Leader—C. E. FARNSWORTH, Professor of Silviculture and Chairman of the Department of Silviculture.

The College is concerned broadly with biological and managerial relationships of forest resources, and the productive uses and benefits of forest products and services. The College has particular interests in the ecological and biological relationships having to do with the management and utilization of water resources; with problems of water quality, quantity, and availability as these are related to land use and development activities; and with the special problems of the forest industries which utilize water in manufacturing processes or produce by-products which affect water quality. The rehabilitation, protection and improvement of watersheds is an important corollary area of interest.

Graduate study programs in water resources may be arranged on an informal basis within several departments of the College. Such departmental programs are usually organized within the Departments of Forestry Economics, Forest Management and Engineering, Silviculture, Landscape Architecture, Forest Zoology, Forest Entomology, Forest Chemistry, or Paper Science and Engineering and often involve support from several Colleges of Syracuse University.

The formal Interdisciplinary Program in Water Resources was organized in 1968 to supplement departmental programs by providing a sound basis for graduate academic programs designed to emphasize the multidisciplinary aspects of water resources. This effort recognized that water relationships are important in almost every aspect of human concern and merit attention as integrative and central elements rather than accessories. The Water Resources Program makes available to graduate students pertinent resources of the College and of Syracuse University, and where appropriate, those of other units of the State University. The State University Water Resources Center located at the College provides particularly strong support to this program.

The program is not structured in terms of required courses or content. Attention is given to the particular objectives of each student who enrolls in the program. Within the framework of the general graduate study requirements of the College, courses, problems and seminars are selected to attain the specific objectives and special interests sought by the student. The academic competence required is demanding. The programs arranged are broadly integrative rather than concentrated in a discipline. Critical review of the program proposed for each student is made by an assigned program committee to ensure that institutional standards are maintained and program objectives are met.

A major professor is assigned by the Program Leader to accept primary responsibility for the program of each student. Two additional faculty members in areas of expected academic or research emphasis are also selected. These three faculty members constitute the academic program committee for the student. The student is required to submit a formal report to the program committee consisting of a detailed work plan describing and defending his academic and research objectives and a schedule of courses and other elements of his contemplated study. This report is reviewed by the program committee, and is made a part of his permanent file. It is reviewed and updated at the beginning of each semester. The program committee will also serve as the thesis committee.

### Organic Materials Science

Program Leader—Michael M. Szwarc, Distinguished Professor of Chemistry and Director of SUNY Polymer Research Center.

Organic Materials Science is that segment of the natural sciences that deals with structure-property relationships in organic materials. The College of Forestry has long been involved in various aspects of Organic Materials Science through programs in the sciences of paper, polymers and wood. An understanding of the behavior of materials in general has developed rapidly in recent years and it is now clear that many of the fundamental concepts of material properties are applicable to both natural and synthetic polymers. This thinking has led to establishment of the new interdisciplinary program in Organic Materials Science. This program involves the Departments of Forest Chemistry, Paper Science and Engineering, and Wood Products Engineering, the Empire State Paper Research Institute, the Cellulose Research Institute, and the State University Polymer Research Center.

Graduate programs in Organic Materials Science are available at both the master and the doctoral level. Because of the breadth of the field it is expected that most students work for the doctoral degree. Programs consist of course work and research. Course work requirement is tailored to build upon the individual student's undergraduate background and experience. Entering students are expected to have a Bachelor's degree in Wood or Paper Science, Polymer Science, Chemistry, Physics, or Engineering. The course work portion of the Organic Materials Science program will be directed toward background preparation in solid state and polymer science. Near the end of the student's course work program he will be exposed to the modern concepts of the structure-property relationships that are of importance in organic materials. Research topics will be selected to permit the student to explore in depth an aspect of organic materials in which he has a particular interest.

Students registering in the Organic Materials Science program satisfy all college-wide requirements for advanced degrees. Each student will be assigned a major professor and a faculty committee who will help him plan his course work program and who will serve as consultants on his research project. Courses will be selected from those offered, both at the College of Forestry and the Colleges of Engineering and Liberal Arts at Syracuse University. The research work will be carried out in College of Forestry laboratories which are particularly well equipped for materials science studies.

### Forest Land Use and Regional Planning

Interdepartmental graduate programs involving the Department of Forest Management, the School of Landscape Architecture, and the Department of Forestry Economics. See these departmental and School statements for further information.

### Forest Soils

Interdepartmental graduate programs involving the Departments of Silviculture, Forest Management, Forest Botany and Pathology, Forest Entomology, Forest Zoology, and Forest Chemistry. See these departmental statements for further information.

### Chemical Ecology

Interdepartmental graduate programs involving the Departments of Forest Chemistry, Forest Botany and Pathology, Forest Entomology and Forest Zoology. See these departmental statements for further information.

### Forest Recreation

Interdepartmental graduate programs involving the Departments of Forest Management, Forestry Economics, and the School of Landscape Architecture. See these departmental and School statements for further information.

### Plant Physiology—Biochemistry

Interdepartmental graduate programs involving the Departments of Forest Botany and Pathology and Forest Chemistry. See these departmental statements for further information.

## VIII

## CONTINUING EDUCATION

The philosophy that education is a lifelong pursuit is an ancient one, and was written into the law creating the College of Forestry. This concept is doubly important to the sciences and professions in this technological age, when new knowledge is bursting in all directions. Hence, the College has, over the years, succeeded in communicating knowledge on forest resources management, utilization and conservation to a wide variety of off-campus publics. The entire College faculty has contributed to these programs.

Conferences, symposia, seminars and short courses on various aspects of forestry and the related sciences are conducted at both the basic and applied levels. Audiences include forest owners, managers, and operators; wood engineers and forest industries personnel; academic and scientific groups, conservation and recreation personnel from local, and state agencies, and other public and private planning groups and citizen-action committees. General and technical publications, a specialized film library, series of radio programs, a speakers' bureau, and a limited number of special programs on commercial television are the primary mass media employed.

The College recognizes that the informational needs of New York's citizens are undergoing change. Some of the factors now affecting the continuing education program are: the abandonment of farmland and the increasing urban character of the population, the changing pattern of ownership of forestland, the rise in level of education and sophistication in a more affluent society, the dynamics of technological change, and the increase in leisure time, greater mobility in travel, and outdoor recreation.

In looking to the future, the College is aware of society's increasing interest and concern with natural resources, the quality of man's environment, the near crisis in water resources, and the need for greater outdoor recreation opportunities. This trend has been called "a growing resource ethic"—an awareness of the obvious and subtle relationships between man and his natural environment, and a desire to enhance them.

This movement of widespread interest and concern comes at a time of accelerating technological obsolescence for the practicing forestry professional, resource scientist and engineer, public and industrial leader, conservation and science teacher, and the general public. Continuing education programs play a vital role in helping to close the gap between new technology and the demands of society.

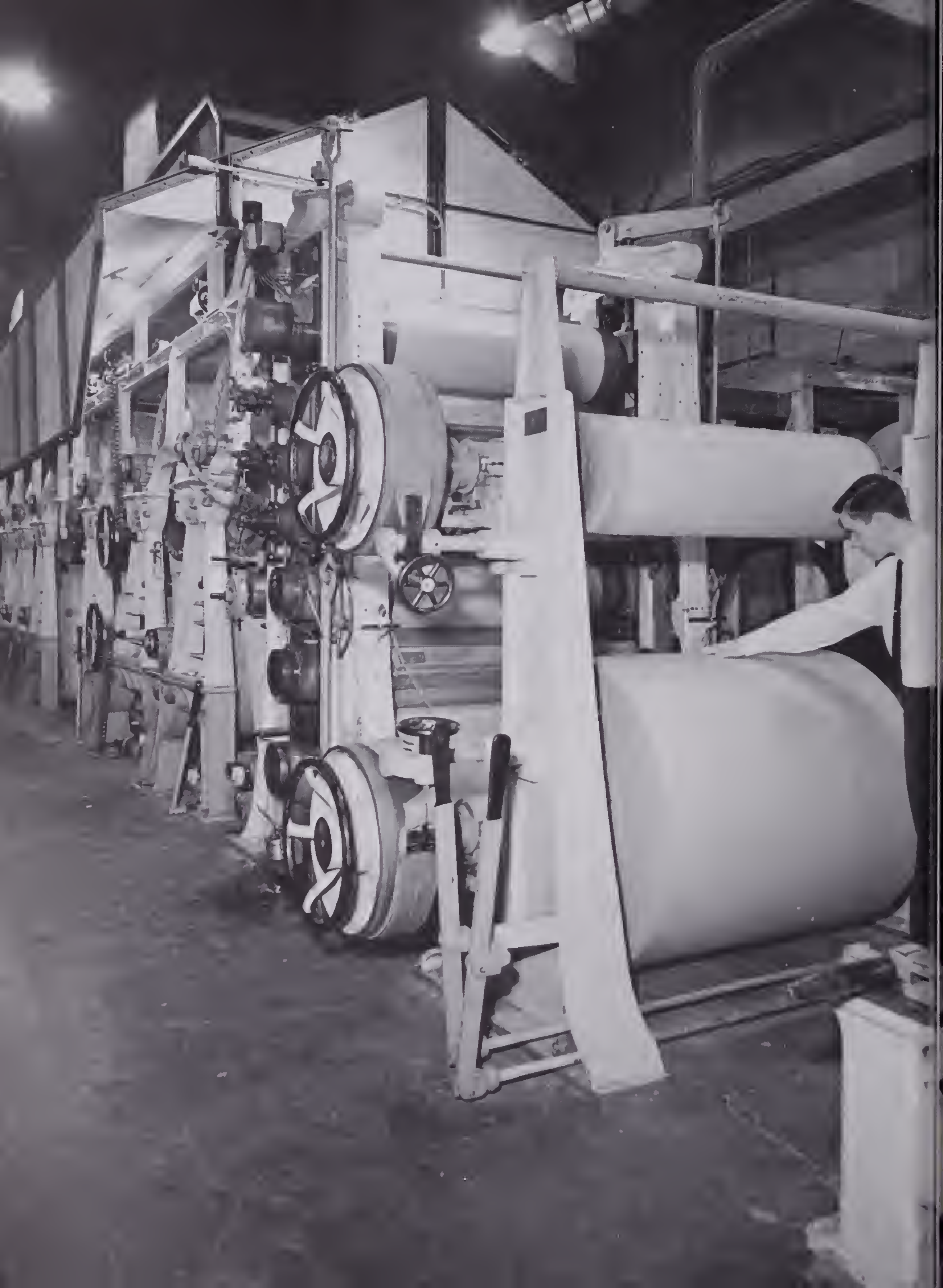
At the College of Forestry, primary attention is given to three basic objectives:

1. Updating personnel whose professional, scientific, technical and production management responsibilities are in areas served by the College. Here the aim is to provide more recent and better knowledge for improved performance of responsible tasks.

2. Deepening the knowledge of a specific, relatively narrow well-defined facet of professional, technological or managerial development, often that which results from new approaches or relationships, or new research or methods.

3. Broadening the awareness and appreciation of the general public concerning the forests and other natural resources of New York, the rational use of forestlands for timber production, recreation, wildlife, and watershed protection, and the jobs, services, and products derived from these basic resources.

For information on specific continuing education projects, inquiries should be sent to: Coordinator of Continuing Education, State University College of Forestry, Syracuse, N. Y. 13210.



# IX

# COURSE OFFERINGS

The academic resources of three institutions — the State University College of Forestry, Syracuse University, and the State University Upstate Medical Center — are available to undergraduates and graduate students in developing their study programs at the College.

In addition to the many professional and basic science courses offered by the College, a wide range of offerings are taken either as required courses or are available as electives at adjacent Syracuse University. The required courses are in certain subject areas of chemistry, engineering, physics, mathematics, geology, English, business law, personnel relations, and public address. The elective courses include most academic offerings of Syracuse University and representative subject areas are the humanities, social sciences, life sciences, physical sciences, engineering, mathematics, and the arts. Descriptions of Syracuse University courses are not included in the following College of Forestry courses.

In graduate programs at the College, Syracuse University courses are used extensively in the fields of mathematics, physics, chemistry, biology, engineering, economics, business, and citizenship. The State University Upstate Medical Center has courses available for graduate programs in the areas of anatomy, biochemistry, cytology, microbiology, and physiology.

## DESCRIPTION OF COLLEGE OF FORESTRY COURSES

The courses offered by the College are grouped by general subject areas, and the number of credit hours appears after the course title. A credit hour means one recitation (or lecture) hour per week. Three laboratory hours are equivalent to one lecture hour.

### COURSE NUMBERING SYSTEM (Effective September, 1968)

I. Code Levels:

| | |
|---|---|
| 000–099 | Non-credit courses |
| 100–199 | Freshman courses |
| 200–299 | Sophomore courses |
| 300–499 | Junior & senior courses |
| 500–599 | Junior & senior courses which may be accepted for graduate credit at the discretion of the graduate student's major advisor, usually with the requirement of additional work to be performed. |
| 600–699 | Graduate courses designed primarily for the beginning graduate students but available for credit to all graduates. |
| 700–899 | Advanced graduate courses designed primarily for second and third year graduates and beyond, but available to all graduates. |
| 900–999 | Special graduate courses available only to doctoral students. |

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## APPLIED MATHEMATICS

### 360. INTRODUCTION TO COMPUTER PROGRAMMING

*3 credit hours*

The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages for problem solving. The course will cover instruction in Fortran IV, and an Assembly language plus some discussion of PL/1, Algol, APL, and use of software operating systems. This course or a demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall & Spring. Mr. C. N. Lee & Staff.

### 560. INFORMATION PROCESSING FUNDAMENTALS

*3 credit hours*

The course presents problem solving and analytical structures, and practice in their application by use of a digital computer. Selected portions from the two general processing categories of numerical analysis and information systems are presented for discussion and study. The purpose is to develop an awareness with some understanding and proficiency in automated problem-solving systems. Fall. Mr. C. N. Lee & Staff.

*Prerequisites:* Integral calculus and proficiency in computer programming.

### 571. INTRODUCTION TO STATISTICAL ANALYSIS

*3 credit hours*

Two hours lecture and three hours lab. Elementary probability, sampling distributions, statistical estimation, hypothesis testing, inferences regarding means and variances, simple regression and correlation, and determination of sample size. Fall & Spring. Mr. Kasile.

*Prerequisite:* Junior or Senior standing.

### 591. INTRODUCTION TO PROBABILITY AND STATISTICS

*3 credit hours*

Two hours lecture, three hours lab. Bases for application of standards of accuracy and statistical methods in forest science and technology; elementary probability in relation to the distribution of random errors and the measurement and control of these errors. Fall. Mr. Bickford.

*Prerequisites:* Two semesters of calculus.

### 593. INTRODUCTION TO ANALYSIS OF VARIANCE

*3 credit hours*

Two hours lecture, three hours lab. One and two-way analysis of variance, multiple comparisons, subsamples, unequal sample size, tests of hypotheses, statistical estimation, determination of sample size. Fall. Mr. Kasile.

*Prerequisites:* A M 571 or A M 591. or equivalent.

### 595. INTRODUCTION TO SAMPLING TECHNIQUES

*3 credit hours*

Two hours lecture, three hours lab. Introduction to the scientific basis of sampling: selecting an appropriate sampling unit; choosing an efficient design; calculating sampling error; determining a sample size to meet stated objectives. Spring. Mr. Bickford & Staff.

*Prerequisites:* A M 571 or equivalent.

### 719. STATISTICAL ANALYSIS

*3 credit hours*

Two hours lecture, three hours lab. A treatment of statistical inference, including paired design, group design, linear regression and correlation, one way analysis of variance, and some applications of chi-square. Calculation of statistics, tests of hypotheses, and proper interpretation of calculated statistics. Fall. Mr. Bickford.

### 720. ANALYSIS OF VARIANCE

*4 credit hours*

Three hours of lecture and recitation, three hours of lab. Multiway classifications in the analysis of variance, with emphasis on the development of models, including randomized blocks, latin squares, split plots, and factorial designs with fixed effects, random effects, and mixed effects; multiple and partial regression and correlation (including curvilinear), using matrix methods; analysis of co-variance, higher order contingency tables, distribution free methods, and sequential testing. Spring. Mr. Kasile.

*Prerequisite:* Graduate standing and in an introductory course in statistics covering material through the one-way analysis of variance.

### 760. COMPUTER APPLICATIONS

*3 credit hours*

A course presenting some discussion and practice in the application of computers to the solution of complex large-scale problems. A study of simulation techniques provides the opportunity to apply a computer to the solution of problems normally considered outside the realm of classroom experience. A study of some programming systems permits the opportunity to see how computers are used to solve their own problems of efficiency concerned with time; space and reliability. Spring. Mr. C. N. Lee.

*Prerequisites:* AM 560 and AM 591 or the equivalents.

## BIOLOGY (FOREST BIOLOGY)*

### 301. FIELD BIOLOGY (SUMMER SESSION IN FIELD FORESTRY)

*1 credit hour*

One week of field work. Major plant and animal species of the forest community and their dynamic interrelationships with the environment. Mr. Alexander & Divisional Faculty.

### 320. GENERAL ECOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments, ecological factors, energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography and representative ecosystems. Fall. Mr. Alexander.

*Prerequisite:* A year course in biology or equivalent.

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*See also listings for Forest Botany, Forest Entomology and Forest Zoology.

### 330. PRINCIPLES OF GENERAL PHYSIOLOGY

*3 credit hours*

Three hours of lectures. Introduction to the dynamics of living systems with emphasis on the universality of the biological world. Fall. Mr. Brezner.

*Prerequisite:* One semester of organic chemistry.

### 498. RESEARCH PROBLEM IN BIOLOGY

*1-3 credit hours*

Independent research in topics in Forest Biology for the superior undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions, and critiques scheduled as necessary. Final written report required for departmental record. Fall & Spring. Staff.

*Prerequisite:* Consent of instructor.

### 515. ADVANCED LIMNOLOGY

*4 credit hours*

Note: SUNY, Albany No. BIO 516

Eight weeks, two full days/week. Comprehensive analysis of primary and secondary producers in a selected series of Adirondack lakes and streams. Lecture discussion sessions to serve to direct individual student projects detailing the flow of energy and circulation of matter in a variety of mountain habitats. Summer Session I & II, Cranberry Lake Biological Station. Mr. McNaught, SUNYA.

*Prerequisite:* Bio 202, 12 hours of biology.

### 521. ECOLOGY OF FRESHWATERS

*2 credit hours*

Note: SUNY, Albany No. BIO 421

Two full days/week for four weeks. Experimental and observational studies of environmental and biotic interactions, influencing productivity of freshwaters. Basic concepts at the organismic, population, and community level. Summer Session I, Cranberry Lake Biological Station. Mr. Stross, SUNYA.

*Prerequisite:* A course in ecology.

### 570. FUNDAMENTALS OF GENETICS

*4 credit hours*

Three hours of lecture, three hours of lab. A general course in genetics. Breeding experiments with animals and plants are used to demonstrate the principles of heredity. The application and role of genetics in research is stressed. Fall. Mr. Valentine.

*Prerequisites:* F Bot 100, F Zool 100 or equivalent courses.

### 620. CHEMICAL ECOLOGY

*3 credit hours*

Two hours of lecture and one hour of discussion. A treatment of biological phenomena incorporating elements of ecology, physiology and chemistry as a basis for development and behavior and survival. Emphasis is on intra- and interspecific relationships involving chemical messengers at the organismal population and community levels. Spring. Mr. Simeone.

*Prerequisites:* Organic Chemistry, General Ecology, General Physiology.

### 722. BIOCLIMATOLOGY

*2 credit hours*

Note: SUNY. Albany No. ATM 513

Two full days/week, for four weeks. Principles of climatology and meteorology as they relate to studies of the biosphere. Emphasis is upon ecologic problems and microclimatic techniques related to forestry, agriculture, and industry. Summer Session II, Cranberry Lake Biological Station. Mr. Scott. SUNYA.

*Prerequisite:* Consent of instructor.

### 785. HISTOCHEMICAL TECHNIQUES

*3 credit hours*

One lecture and two labs. The techniques of the microtomecryostat, freeze-drying, and freeze substitution, histochemical stains, and autoradiography in the elucidation of the constitution of cells and tissues. Spring (even calendar years). Messrs. Tepper & Krall.

*Prerequisites:* Microtechnique and organic chemistry.

### 835. MEMBRANES AND BIOLOGICAL TRANSPORT

*3 credit hours*

Two hours of lecture and one hour of discussion. Composition, structure and physical properties of membranes. Membrane functions including transport, bioelectricity and cell compartmentalization. Specific transport processes in biological systems. Fall (alternate years). Mr. Schaedle.

*Prerequisites:* One semester of biochemistry and an advanced physiology course, or permission of the instructor.

### 997. BIOLOGY SEMINAR

*1-3 credit hours*

One to three hours of lecture-discussions per week. The course emphasizes current concepts and developments in biology. Fall and/or Spring. Mr. Zabel & Staff.

## BOTANY (FOREST BOTANY AND PATHOLOGY)*

### 100. GENERAL BOTANY

*4 credit hours*

Prerequisite to all other courses in Forest Botany. Three hours of lecture, three hours of lab. Introductory study of the morphology, anatomy, physiology and reproduction of seed plants. Fall. Mr. Morrison, Mrs. Wang & Staff.

### 210. DENDROLOGY I

*2 credit hours*

One hour lecture and one three-hour lab/field trip each week. Field study, identification, taxonomy, and elementary silvics of important forest trees of North America. Fall. Mr. Ketchledge & Staff.

### 211. DENDROLOGY II

*1 credit hour*

One three-hour lab/field trip each week. A continuation of the first semester course with special emphasis on species native to Northeastern North America or of major economic or world-wide importance. Spring. Mr. Ketchledge.

### 260. SHADE TREE PATHOLOGY

*3 credit hours*

Two hours of lecture and three hours of lab per week. The common diseases of woody plants are stressed. Emphasis is placed on disease recognition and control and on the reaction of woody plants to their environments. Spring. Mr. Silverborg.

*Prerequisite:* F Bot 210.

### 310. CLASSIFICATION OF THE PLANT KINGDOM

*3 credit hours*

Two hours of lecture and three hours of lab. Introductory study of the Plant Kingdom with emphasis on the angiosperms. Spring. Mr. Morrison, Mrs. Wang & Staff.

### 330. PLANT PHYSIOLOGY

*2 credit hours*

Two hours of lectures. Descriptive aspects of the fundamental activities of plants. Subjects to be covered include cell structure, water and mineral metabolism, organic nutrition and a brief introduction to biological control mechanisms. Will not satisfy the plant physiology requirement of botany majors. Fall. Mr. Schaedle.

*Prerequisite:* F Bot 100 or equivalent.

### 510. MYCOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Comprehensive survey of the morphology, taxonomy, and activities of fungi. Laboratory experience in isolation and identification of fungi and experimental work with fungi in pure culture. Fall. Mr. Griffin.

*Prerequisite:* F Bot 310.

### 515. SYSTEMATIC BOTANY

*2 or 3 credit hours*

Two hours of lecture, three hours of lab. Identification, nomenclature and classification of flowering plants with special emphasis on local flora and on developing the ability to classify the plants of any region. Spring. Mr. Morrison.

*Prerequisite:* F Bot 310 or permission of the instructor.

### 517. ADIRONDACK FLORA

*2 credit hours*

Note: SUNY, Albany No. BIO 517

One full day/week for eight weeks. Field study of the summer flora of the Adirondack Mountains. Summer Session I & II. Cranberry Lake Biological Station. Mr. Hillebrand, SUNYA. and Mr. Ketchledge, College of Forestry.

*Prerequisite:* An elementary course in Systematic Botany.

### 522. ECOLOGY OF FOREST COMMUNITIES

*2 credit hours*

Note: SUNY, Albany No. BIO 422

Two full days/week for four weeks. Study of the structural and functional characteristics of selected Adirondack forest ecosystems; techniques of vegetational and environmental analysis. Summer Session II, Cranberry Lake Biological Station. Mr. Ketchledge, College of

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*See also listings for Forest Biology.

Course offered in odd calendar years. Spring. Mr. Silverborg & Mr. Manion.

*Prerequisite:* F Bot 560 or 562.

### 870. POPULATION GENETICS

*Three hours of lecture. 3 credit hours*

The principles and theorems of population genetics based upon gene frequencies and genic effects in theoretical populations. Effects of inbreeding, selection, mutation, fitness, migration, and other factors are considered. Composition and changes in natural and laboratory populations are related to genetic theory. Spring (even numbered years). Mr. Valentine.

*Prerequisites:* F Biol 570, I semester of calculus; A M 720, or permission of instructor.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## CHEMISTRY (FOREST CHEMISTRY)

### 221. ORGANIC CHEMISTRY I

*3 credit hours*

Two hours of lecture, one hour of recitation. A survey of representative classes of carbon compounds with an emphasis on structure, nomenclature and fundamental reactivity and other important properties, uses, and characteristics. Fall. Mr. Silverstein and Mr. LaLonde.

*Prerequisite:* One year of Freshman chemistry.

### 222. ORGANIC CHEMISTRY LABORATORY I

*1 credit hour*

One three-hour laboratory period. Laboratory techniques in organic chemistry. Melting points, distillation, recrystallization, extraction, column and thin layer chromatography. Qualitative organic functional group analysis. Fall. Mr. Baum and laboratory assistants.

*Prerequisite:* One year of Freshman chemistry.

### 223. ORGANIC CHEMISTRY II

*3 credit hours*

Two hours of lecture, one hour of recitation. A study in depth of the reactivity characteristics of the various classes of carbon compounds. The relation of chemical reactivity and physical properties to electronic and three dimensional characteristics of carbon compounds. Spring. Mr. Silverstein and Mr. LaLonde.

*Prerequisites:* One year of Freshman chemistry and one semester of organic chemistry.

### 224. ORGANIC CHEMISTRY LABORATORY II

*1 credit hour*

One three-hour laboratory period. Continuation of F Chem 222. Simple physical, quantitative and instrumental techniques applied to organic chemistry. Gas chromatography, polarimetry, kinetics. Introduction to synthesis. Spring. Mr. Baum and laboratory assistants.

*Prerequisite:* F Chem 222 or equivalent.

### 325. ORGANIC CHEMISTRY III

*3 credit hours*

Two hours of lecture, one three-hour lab period. Classical and recent literature syntheses of organic compounds, employing advanced techniques. Fall. Mr. Silverstein and Mr. LaLonde.

Prerequisite: Two semesters of elementary organic chemistry.

### 495. INTRODUCTION TO PROFESSIONAL CHEMISTRY

*1 credit hour*

Professional ethics and responsibilities of the practicing chemist. Employer-employee relations, legal and legislative relations. Alternate employment opportunities. Professional organizations. Safety in the laboratory. Organization and use of chemical literature. Selection of research topic and literature survey. Fall. Mr. Schuerch and Staff.

Prerequisite: Upper division status. Senior status preferred.

### 496. SPECIAL PROBLEMS IN CHEMISTRY

*1-3 credit hours*

An opportunity for a special problem, technique development, independent or unstructured study in an area related to the chemical profession. The work may be technical, professional, or interdisciplinary. Advisors outside this department may be solicited. A brief proposal must be presented for approval with specific arrangements outlined including faculty advisor and objectives of the study. Evidence of competence and appropriate effort is required for credit. A written report will usually be expected. Fall or Spring. Staff.

*Prerequisite:* Upper division status.

### 497. UNDERGRADUATE SEMINAR

*1 credit hour*

Literature surveys and seminars on topics of current research interest and recent advances in Chemistry. Spring. Mr. Walton.

### 498. INTRODUCTION TO RESEARCH

*6 credit hours*

Directed laboratory research with special laboratory techniques. Typewritten report on data, procedures, results and conclusions. Spring. Staff.

### 520. NUCLEAR AND RADIATION CHEMISTRY

*2 credit hours*

The two one-hour lectures will cover the information required for the basic understanding of nuclear reactions, the types of radiation emitted, the instrumentation necessary to detect and measure this radiation, the principles of radioisotope tracer techniques, and radiation chemistry which is the effect of radiation on organic systems. Visits to the Cornell Reactor and the Nuclear Medicine Department of the Upstate Medical Center will be arranged. Spring. Dr. John A. Meyer.

*Prerequisites:* Physical, organic and inorganic chemistry or by permission of the instructor.

*Note:* This course can be taken independently of F Chem 521.

### 521. NUCLEAR CHEMICAL TECHNIQUES

*1 credit hour*

The laboratory will consist of one four-hour laboratory class every two weeks, with one hour to be made up at the student's discretion to accommodate counting periods which extend over several weeks. A short movie by the AEC each week will be required for the sixth hour. The laboratory will give each student the opportunity to use the individual counting instruments, gain experience in the handling and preparation of radioactive samples and the use of the 1000 Curie cobalt source in radiation chemistry. Spring. Dr. John A. Meyer.

*Prerequisites:* Physical, organic and inorganic chemistry or permission of the instructor. Advance tentative registration is required.

*Corequisite:* F Chem 520.

### 530. BIOCHEMISTRY I

*3 credit hours*

Three hours of lecture. General biochemistry with emphasis on cellular constituents and metabolic reactions. The chemical, physical and biological properties of amino acids, proteins, carbohydrates and their intermediary metabolism will be discussed. The chemistry of enzymes, energy transfers and biological oxidations will also be covered. Fall. Mr. Sondheimer.

*Prerequisite:* One year of organic chemistry.

*Pre or corequisite:* One year of physical chemistry.

### 531. BIOCHEMISTRY LABORATORY

*2 credit hours*

One hour lecture and discussion, three hours laboratory. This course will stress techniques used in biochemical research. Techniques used include various types of chromatography, electrophoresis, and spectrophotometry, and methods involved in the isolation, purification and assay of enzymes. Fall. Mr. Walton.

*Prerequisite:* One semester of quantitative analysis with laboratory.

### 532. BIOCHEMISTRY II

*3 credit hours*

Three hours of lecture. Topics discussed are: application of tracer techniques to biochemistry, the chemical and biochemical properties of lipids, theories on the origin of life, photosynthesis and the biosynthesis of steroids and terpenes, plant aromatics, amino acids, porphyrins and other aspects of nitrogen metabolism. Spring. Mr. Sondheimer.

*Prerequisites:* F Chem 530 and its pre and corequisites.

### 539. PRINCIPLES OF BIOLOGICAL CHEMISTRY

*3 credit hours*

Three hours of lecture. Principles of biochemistry with emphasis on their relationship to biology. Topics include basic metabolic pathways, structure and function of proteins, enzymes, and nucleic acids, energy relationships, and biochemical control mechanisms. Fall. Mr. Walton.

*Prerequisites:* A two-semester course in organic chemistry desirable, but a one-semester course is acceptable. This course not open to Forest Chemistry majors.

### 550. INTRODUCTION TO POLYMER CHEMISTRY I

*3 credit hours*

Three hours of lecture. Mechanism and kinetics of condensation and addition polymerization; stereochemistry of macromolecules; chain statistics and polymer solution theory; molecular weight determination and hydrodynamic properties; polyphase structure of natural and synthetic polymers. Fall. Mr. Smid.

*Prerequisites:* One year of organic chemistry and one year of physical chemistry.

### 551. POLYMER TECHNIQUES

*2 credit hours*

One hour of lecture-discussion and three hours of lab; lab reports. Techniques of polymer preparation: free radical solution and emulsion polymerization, copolymerization. Molecular weight determination by light scattering, osmometry, viscosity, ultracentrifugation. Structure characterization by x-ray diffraction, electron microscopy, nuclear magnetic resonance, optical rotatory dispersion, polarized microscopy, stress-strain and swelling equilibrium. Fall. Mr. Sarko.

*Prerequisites:* One year of organic and one year of physical chemistry. Concurrent F Chem 550 recommended.

### 552. INTRODUCTION TO POLYMER CHEMISTRY II

*3 credit hours*

Three hours of lecture. Theory of gelatin and network formation. Rubber elasticity, the glassy state and glass transition temperature, the crystalline state and crystallization kinetics, characterization of structure of solid states. Manufacturing and fabrication processes for films, fibers, and plastics. Physical properties and their relation to end use. Spring. Mr. Sarko.

*Prerequisites:* One year organic and physical chemistry, F Chem 550 recommended.

### 556. POLYMER PROPERTIES

*3 credit hours*

Three hours of lecture. Introduction to the physical chemistry of polymers. Includes a description and classification of polymers, crystallization, glass transition, statistics of macromolecules, rubber elasticity, visco-elasticity, polymer solutions, phase equilibria, viscosity, properties of fibers, films, foams, composites. Electrical and optical properties of polymers. Fall. Mr. Smith.

*Prerequisite:* One year of organic chemistry and one year of physical chemistry.

### 571. CELLULOSE, WOOD, AND PULPING CHEMISTRY

*3 credit hours*

Three hours of lecture. Introduction to carbohydrate chemistry. Chemistry of cellulose, hemicelluloses, and lignin. Wood extractives. Distribution of the cell wall components in wood. Chemistry and topochemistry of the major technical pulping and bleaching processes in relation to wood, with emphasis of the effect of acid, alkali, reducing and oxidizing agents on cellulose, hemicelluloses, and lignin. Byproducts in the pulping industry, manufacture of cellulose acetate and rayon. Fall. Mr. Timell.

*Prerequisite:* F Chem 221-224 or equivalent.

*Note:* For a student taking both F Chem 571 and F Chem 572 the maximum credit hours earned is 5.

### 572. CHEMISTRY AND BIOCHEMISTRY OF WOOD

*3 credit hours*

Three hours of lecture. Introduction to carbohydrate chemistry. Chemistry of cellulose, hemicelluloses, and lignin. Wood extractives. Distribution of cell wall components in wood. Chemistry and biochemistry of pectin and starch. Bark chemistry. Photosynthesis. Biosynthesis of wood polysaccharides, lignin, and extractives. Cambium chemistry and formation of xylem and phloem. Aging and biological degradation of wood. Reaction wood. Biochemical evolution of wood. Fall. Mr. Timell.

*Prerequisite:* F Chem 221-224 or equivalent.

*Note:* For a student taking both F Chem 571 and F Chem 572 the maximum credit hours earned is 5.

### 573. CELLULOSE AND WOOD CHEMISTRY LABORATORY

*1 credit hour*

One three-hour laboratory period. Wood analyses. Isolation and characterization of wood components. Proof of structure of cellulose via cellobiose octaacetate. Preparation of carboxymethylcellulose. Characterization of wood polysaccharides by chromatographic techniques. Fall. Mr. Timell.

*Prerequisite:* F Chem 221-224 or equivalent.

### 584. SPECTROMETRIC IDENTIFICATION OF ORGANIC COMPOUNDS

*1-2 credit hours*

Two hours of lecture and discussion. The first half semester (1 credit) will deal with common classes of organic compounds; the second half semester (1 credit) will deal with more complex structures. The use of complementary information from mass, infrared, nuclear magnetic resonance and ultra violet spectrometry will be applied to identification of organic natural products. Fall or Spring. Mr. Silverstein.

*Prerequisites:* Organic Chemistry; one semester of advanced organic for second credit.

### 796. SPECIAL TOPICS IN CHEMISTRY

*1-3 credit hours arranged according to nature of topic*

Lectures, conferences, and discussion. Advanced topics in physical chemistry, organic chemistry, or biochemistry or in the chemistry of cellulose, wood or polymers. Fall & Spring. Staff.

### 798. RESEARCH IN CHEMISTRY

*Credit hours arranged according to nature of problem*

Problems in the physical and organic chemistry of synthetic polymers and in the physical, organic, and biochemistry of polymeric wood components and natural products are assigned. One typewritten report (original and three carbons) required. Fall & Spring. Staff.

Prerequisites depend upon the problem.

### 830. TOPICS IN PLANT BIOCHEMISTRY

*3 credit hours*

Three hours lecture and discussion. Covers topics in biochemistry unique to plants, including photosynthesis, biosynthesis of cell-wall components, phenolics, terpenes, nitrogen metabolism, structure and function of plant hormones, biochemistry of differentiation and growth regulatory mechanisms. Fall & Spring (alternate years). Mr. Walton.

*Prerequisites:* F Chem 530, F Chem 532, or equivalents.

### 850. ORGANIC CHEMISTRY OF POLYMERS

*3 credit hours*

Three hours of lecture, discussion and recitation. A broad survey of polymer forming reactions and polymeric structures. Some relations between molecular structure and useful properties. Special problems in stereochemistry and polymerization mechanisms. Spring. Mr. Schuerch & Mr. Caluwe.

*Prerequisites:* One year of organic chemistry and F Chem 550.

### 855. PHYSICAL CHEMISTRY OF POLYMERS

*3 credit hours*

Three hours of lecture and discussion. Introduction to statistical mechanics of polymers: general problem of random flight, chain statistics and conformations, partition functions: network statistics and rubber elasticity, birefringence, swelling, crystallization. Scattering phenomena: theory of light scattering, scattering from a sphere, scattering from liquids and solids, anisotroph scattering, x-ray scattering. Fall or Spring. Mr. Sarko and Mr. Smith.

*Prerequisites:* F Chem 550 and 552 (or equivalent), Chemistry 656.

### 884. ORGANIC NATURAL PRODUCTS CHEMISTRY

*3 credit hours*

Three hours lecture. The chemistry of terpenoids, steroids and alkaloids with an emphasis on the determination of structure by both modern instrumental methods and chemical degradation. Biogenetic considerations and the confirmation of structure by synthesis are covered. Fall or Spring. Mr. LaLonde.

*Prerequisites:* One semester of advanced organic chemistry.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

997. SEMINAR

*1 credit hour*

Discussion of recent advances in chemistry. Fall & Spring. Messrs. Baum and Szwarc.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## ECONOMICS (FORESTRY ECONOMICS)

### 290. INTRODUCTION TO ECONOMICS FOR FORESTRY

*3 credit hours*

Three hours of lecture and discussion. Population and resources. Trends in the American economy. Supply and demand. Theory of the firm and industry. Composition, measurement, and determination of national income. Monetary and fiscal policies. The roles of government, business and labor. Comparative economic systems. General economic principles are stressed. Fall and Spring. Mr. Petriceks.

### 300. INTRODUCTION TO MACRO-ECONOMICS

*3 credit hours*

Three hours of lecture and discussion. Composition, measurement, and determination of national income. Financial institutions of the United States. Monetary and fiscal policies. The Theory of Economic Growth and problems in attaining adequate levels of economic growth. Spring. Mr. Bennett & Staff.

### 301. INTRODUCTION TO MICRO-ECONOMICS

*3 credit hours*

Three hours of lecture and discussion, Pricing and resource allocation. Supply and demand. Theory of the firm and industry. The role of labor unions in the American economy. Problems in anti-trust policy. The Theory of International Trade. Fall. Mr. Bennett & Staff.

### 496. SPECIAL TOPICS IN RESOURCE ECONOMICS

*1-3 credit hours*

Guided readings, lectures and tutorial conferences for the undergraduate student from any school of the College, designed to help him apply economic analysis to questions within his area of interest. Illustrative topics include the economics of land use and planning; of forest culture; of outdoor recreation; of water or timber management, or related resource production; of wood-using industry; and of the distribution or consumption of forest resources. Fall and Spring. Staff.

*Prerequisite:* Consent of instructor.

### 510. PRINCIPLES OF FORESTRY ECONOMICS

*3 credit hours*

Two hours of lecture, three hours of laboratory. Economics of the production of forest goods and services. Land, labor and capital and their combination in forest production. Supply and demand of various forest products and their changes over time. Economics of taxation and public policy formation. Emphasis is placed upon principles and methods of analysis useful in understanding and in making resource management decisions. Fall. Mr. Christiansen.

*Prerequisite:* F Econ 301 or equivalent.

### 511. ECONOMICS OF THE FOREST BUSINESS

*3 credit hours*

Two hours of lecture, three hours of laboratory. Economic evaluation of alternative uses of land, labor, and capital in the operation of forest properties and related marketing and processing enterprises. Emphasis is on application of principles and methods of economic analysis. Part of the term is spent in appraising a forest property and preparing a plan for its operation. Complementary to instruction in FM 556. Spring. Mr. Christiansen.

*Prerequisite:* F Econ 510 or permission of the instructor.

### 520. ECONOMICS OF WOOD-USING INDUSTRIES

*3 credit hours*

Three hours of lecture and discussion. Structure and organization of selected wood-using industries. Analysis of decision-making by the firm. Principles of production and marketing including demand and cost analysis and pricing. Special issues and current problems of the industries, and introduction to the newer mathematical and statistical tools for meeting them. Spring. Mr. Armstrong.

*Prerequisite:* F Econ 290 or equivalent.

### 570. ECONOMICS OF OUTDOOR RECREATION

*3 credit hours*

Group discussion, lectures, guided reading, and student essays on the economic aspects of outdoor recreation. Major topics include: supply and demand for outdoor recreation; theories of value and choice for both recreationists and recreation-resource managers; the role of outdoor recreation in economic development; and application of economic analysis to recreation planning and public policy issues. Spring. Mr. C. Miller.

*Prerequisites:* F Econ 290 or 301, or equivalent; EI 511 recommended.

### 710. ADVANCED PRINCIPLES OF FORESTRY ECONOMICS I

*3 credit hours*

Two hours of lecture, two hours of discussion. Intensive study of the micro-economics of forestry. Offered only to graduate students. Fall. Mr. Duerr.

### 711. ADVANCED PRINCIPLES OF FORESTRY ECONOMICS II

*3 credit hours*

Two hours of lecture, two hours of discussion. Intensive study of the macro-economics of forestry. Offered only to graduate students. Spring. Mr. Duerr.

### 796. SELECTED TOPICS IN THE ECONOMICS OF FORESTRY

*Credit hours to be arranged*

Study of a topic in forestry economics, with emphasis on wide reading, original thinking, and analytical writing. Fall & Spring. Staff.

### 797. SEMINAR

*1-3 credit hours*

Group discussion and individual conference. Critical examination of economic ideas and policies in forestry. Topics of interest to the group are selected for study, such as current developments in analytical method or in economy policy, the economic problems of small business in forestry, national or world requirements for the goods and services of the forest, or the economy of a forest region. Primarily for graduate students in forestry economics and world forestry. Fall & Spring. Mr. Miller.

### 800. HISTORY OF ECONOMIC THOUGHT IN FORESTRY

*3 credit hours*

Three hours of discussion or conference. Systematic study and critique of the development of the thinking of foresters and economists with respect to some segment of the subject matter of forestry economics. Review of major individual contributions to thought and the influence of leading scholars upon the thinking of others. Appraisal of the leading schools of thought. Offered only to graduate students. Fall or Spring. Mr. Bennett.

### 830. RESEARCH METHODS

*3 credit hours*

Three hours of discussion or conference. Study of the elements of research methodology and their application in identifying, analyzing and resolving problems in forestry economics. Fall. Staff.

*Prerequisites:* Offered to Ph.D. candidates in Forestry Economics. Open to others by permission of instructor.

### 840. PROFESSIONAL WORKSHOP IN FORESTRY ECONOMICS

*3 credit hours*

Two hours of seminar and one three-hour laboratory each week. F Econ 840 is an internship-workshop in the interpretation of forest economics. The seminars are devoted to problems of programming, materials, instruction, testing, and evaluation. The laboratory incorporates leading a one-hour discussion group in F Econ 301, with preparation for that discussion group and with the writing of a report on the laboratory to be used in a subsequent seminar meeting. Fall. Mr. Bennett.

*Prerequisites:* Econ 605, Econ 606, and either F Econ 830 or permission of instructor.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## ENGINEERING (FOREST ENGINEERING)*

300. FOREST ENGINEERING PROBLEMS

*1 credit hour*

One hour of lecture and discussion. An introduction to methodologies for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Fall and Spring. Staff.

*Prerequisite:* Junior Standing in F Engr.

301. PLANE AND GEODETIC SURVEYING

*3 credit hours*

Two hours lecture and recitation, three hours of lab. A treatment in depth of the principles of plane surveying, with particular emphasis on the analysis of errors, curvilinear survey, astronomical observations and potential computer relationships. Spring. Staff.

*Prerequisite:* A M 591.

310. ROADS

*3 credit hours*

Two hours of lecture, three hours of field and laboratory practice. Engineering principles in the planning, location, design, construction, and maintenance of forest roads. Contract specifications, costs, drainage, typical sections, grades, curves, surfacing materials, use of heavy equipment, and explosives. Principles in the location, installation, and maintenance of communications. Spring. Mr. Koten.

*Prerequisite:* F Mgt 201 or F Engr 301.

340. HYDROLOGY

*3 credit hours*

Two lectures and three hours of lab per week. The mechanics of water storage and dispersion; hydrostatics; stream function; velocity potential; dimensional analysis and momentum theory. The natural hydrologic cycle is studied in relationship to changes and structural controls imposed by man. Spring. Mr. Tully.

*Prerequisites:* Dynamics (or concurrent), Introductory Statistics.

410. STRUCTURES

*3 credit hours*

Two hours of lecture, three hours of lab. Engineering principles in the planning, design, construction, and maintenance of forest structures such as timber bridges, trusses, towers, dams, water supplies, sewage systems, and other facilities. Properties of timber, concrete, steel, and other structural materials. Fall. Mr. Tully.

*Prerequisite:* M E 225.

412. PRINCIPLES OF PRODUCTION (HARVESTING)

*3 credit hours*

Three lectures per week. Fundamentals of harvesting wood products for optimum utilization; principles of production management, materials handling and transportation systems, inventory and cost control, product and market development; utilization problems. Analysis of integrative case situations for wood-based enterprises. Fall. Mr. Palmer.

*Prerequisite:* F Mgt 522.

502. TERRESTRIAL GEODESY

*3 credit hours*

Two hours lecture and three hours laboratory. Theory and techniques of collection, reduction, and adjustment of precise geodetic measurements for leveling, triangulation, and trilateration. Fall. Staff.

*Prerequisites:* F Engr 301 or equivalent.

503. ASTRO-GEODESY

*3 credit hours*

Two hours lecture and three hours laboratory. Theory and techniques of collection, reduction, and adjustment of astronomical observations for position, direction, and time determination with emphasis on satellite geodesy. Spring. Staff.

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*See also listings for Forest Management.

*Prerequisite:* F Engr 301 or equivalent.

### 510. TRANSPORTATION SYSTEMS

*3 credit hours*

Two hours of lecture and three hours of laboratory. Interrelationships among natural features, transportation types, design, and management objectives to provide the most effective system within the given framework. Basic engineering principles in the planning, location, design, construction, and maintenance of suitable transportation systems to serve various aspects of forest resource management. Spring. Staff.

*Prerequisites:* F Engr 301 and F Engr 531 or equivalents.

### 530. SOIL MECHANICS

*2 credit hours*

Two hours of lecture, three hours of laboratory (9 weeks only). The physical, mechanical and hydraulic properties of cohesive and non-cohesive soils. A nine-week course, concluding with specifications of engineering soils. Credit towards forest engineering degree may be granted only by the completion of additional assigned work. Fall. Mr. Tully.

*Prerequisite:* Senior class standing or permission of instructor.

*Note:* A student may not enroll in and receive credit for both F Engr 530 and F Engr 531.

### 531. SOIL MECHANICS FOR ENGINEERS

*3 credit hours*

Two hours of lecture, three hours of lab. The physical, mechanical, and hydraulic properties of cohesive and non-cohesive soils. Application of these and other engineering principles to the design of earthen structures common to the forest environment. Fall. Mr. Tully.

*Prerequisites:* F Engr 340; also, C E 325 concurrently.

*Note:* A student may not enroll in and receive credit for both F Engr 530 and 531.

### 540. HYDROLOGIC CONTROLS

*3 credit hours*

Three hours of lecture and discussion. A continuation of F Engr 340, emphasizing the application of hydrologic principles. Basic hydraulics of controlling structures, open channel flow, sedimentation, filtration systems, reservoirs and water law as applied to forest and range land hydrology. Spring. Mr. Hawkins.

*Prerequisites:* F Engr 340, F Engr 530 or F Engr 531, C E 327 or equivalents as evaluated by the instructor.

### 563. PHOTOGRAMMETRY

*3 credit hours*

Two hours of lecture and discussion, three hours of lab. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation, and unique requirements are considered. Fall & Spring. Mr. Stanton.

*Prerequisites:* F Mgt 201 (or F Mgt 301 concurrent).

### 566. REMOTE SENSOR INTERPRETATION

*3 credit hours*

Two hours of lecture, three hours of lab. An introduction of remote sensing technology as applied to detection and analysis of the forest environment, soil, water, climate, and vegetation, as an aid to multiple use management. Fall. Staff.

*Prerequisite:* F Engr 563.

### 567. REMOTE SENSOR THEORY

*3 credit hours*

Two hours lecture and three hours laboratory of an in-depth coverage of the theory of remote sensing of the electro-magnetic spectrum and the various methods of phase and amplitude recording. Holographic, photographic, and line scan recordings will be covered. Spring. Staff.

*Prerequisites:* F Engr 563, Math 398 or equivalent.

### 599. FOREST ENGINEERING PLANNING

*3 credit hours*

Three hours of lecture and three hours of laboratory. A synthesis of the fundamental areas of forest engineering in the planning of the physical development of the forest resources. Specific design studies will be made emphasizing the interrelationship of man, forest resources and their multiple services. These studies will lead to the development and application of planning to simulated realistic conditions. Spring. Staff.

### 664. TERRESTRIAL AND NON-TOPOGRAPHIC PHOTOGRAMMETRY

*3 credit hours*

Two hours of lecture, three hours of laboratory per week. The theory and applications of terrestrial and non-topographic photo measurements. Photo-Theodolites, short-focus cameras, and microscopes are used and calibrated to provide meaningful quantitative data from photographs. Spring. Mr. Brock.

*Prerequisites:* F Engr 563 and A M 565 or equivalent.

### 760. ANALYTICAL PHOTOGRAMMETRY I

*3 credit hours*

Two hours of lecture, three hours of lab per week. Mathematical theory of photogrammetry including space resection, orientation, intersection and aerial triangulation. Fall. Mr. Brock.

*Prerequisites:* F Engr 563 and A M 565 or equivalent.

### 761. ANALYTICAL PHOTOGRAMMETRY II

*3 credit hours*

Two hours lecture, three hours lab. A continuation of Forest Engineering 760 leading to more extensive analytical solutions with frame and non-conventional photography. The distortions present in photographs are analyzed and camera and comparator calibrations are treated. Spring. Mr. Brock.

*Prerequisite:* F Engr 760.

### 762. INSTRUMENTAL PHOTOGRAMMETRY I

*3 credit hours*

Two hours of lecture, three hours of lab. The theory and practice of extracting information from photographs with the aid of photogrammetric plotters. Fall. Mr. Brock.

*Prerequisite:* F Engr 563 or equivalent.

### 763. INSTRUMENTAL PHOTOGRAMMETRY II

*3 credit hours*

Two hours lecture, three hours lab. The major subjects of study are photogrammetric optics, the theory and design of optical and mechanical plotters and automatic mapping systems. Spring. Mr. Brock.

*Prerequisite:* F Engr 762 or permission of instructor.

## ENGLISH (COLLEGE OF FORESTRY COURSES)

### 210. ADVANCED COMPOSITION AND LITERATURE

*2 credit hours*

Further development of reading and writing skill begun in Freshman English. Appreciation of imaginative literature is extended by the study of various literary types—fiction, poetry and drama—with special attention to their specific nature and to the development of the skills of interpreting such works. Practice in the principles and techniques of writing, with assignments coordinated with the reading materials, is carried on throughout the course. Fall. Staff.

### 211. TECHNICAL WRITING

*2 credit hours*

The basic feature, characteristics, and forms of technical discourse, with special attention to such expository forms as the abstract, definition, explanation of a process, and technical description in preparation for the writing of a long report dealing with an investigation. Practice is also given in the writing of various kinds of short reports and selected business letters. Spring. Staff.

## ENTOMOLOGY (FOREST ENTOMOLOGY)*

### 300. PRINCIPLES OF FOREST ENTOMOLOGY

*2 credit hours*

Elements of insect classification, living requirements and control manipulations that are prerequisite with further study, to an understanding of insects in relation to applied aspects of forestry. One hour of lecture, three hours of lab/field work. Spring. Mr. Allen & assistants.

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*See also listings for Forest Biology.

### 500. ELEMENTS OF FOREST ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab/field work. General classification of insects, morphology, physiology, ecology, behavior, and basic principles of population control. Emphasis through illustration is on the role of insects in the forest environment. Fall. Mr. Simeone & assistants.

*Prerequisites:* F Bot 100 and F Zool 100.

### 502. FOREST ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab/field trip. Important forest insects and their relation to forest stands, management and silviculture practices and forest uses. Spring. Staff.

*Prerequisites:* F Ento 500 or F Ento 300.

### 503. SHADE TREE ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab/field trip. Common insects of woody ornamentals are stressed. Relation of environment to insect attack. Modern methods, equipment, control and prevention. Spring. Staff. Course offered in odd calendar years.

*Prerequisite:* F Ento 500 or F Ento 300.

### 504. INSECTS AFFECTING FOREST PRODUCTS

*3 credit hours*

Two hours of lecture and one hour of lab. Biology, chemistry, identification, prevention of injury, and control of insects injurious to forest products and wood in use. Spring. Mr. Simeone.

*Prerequisite:* F Ento 500 or F Ento 300. Exceptions with permission of instructor.

### 505. SURVEY OF ENTOMOLOGICAL LITERATURE AND HISTORY

*1 credit hour*

One hour of lecture. A survey of history of entomology and related sciences. Library techniques and literature sources are discussed with emphasis on entomological bibliography. Spring. Mr. Brezner.

### 550. FOREST AND AQUATIC INSECTS

*2 credit hours*

The forest and aquatic insects of Cranberry Lake Region and their role in these environments and habitats. Insect collection required. Summer (four-week period), Cranberry Lake Field Biology Station. Staff.

*Prerequisites:* Background in botany, zoology, systematics and ecology.

### 580. INSECT MORPHOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. A comparative study of external morphology of insects; modifications of homologous parts; musculature associated with feeding, locomotion, reproduction, and intersegmental movements. Fall. Mr. Kurczewski.

*Prerequisite:* F Ento 500.

### 610. GENERAL INSECT TAXONOMY

*3 credit hours*

Two hours of lecture, three hours of laboratory. Nomenclature, classification, literature, and keys. Insect collection required. Spring. Mr. Kurczewski.

*Prerequisites:* F Ento 500, F Ento 580.

### 620. AQUATIC ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. The biology, ecology, and identification of fresh water insects, with emphasis on the role of aquatic insects in the hydrobiome. Fall. Mr. Brezner.

*Prerequisite:* F Ento 500 or its equivalent.

### 630. INSECT PHYSIOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Study of the life processes in insects; introduction to modern physiological instrumentation and laboratory methods. Spring. Mr. Brezner.

*Prerequisite:* F Biol 330.

### 660. INSECT TOXICOLOGY

*3 credit hours*

Two hours of lecture, three hours of laboratory. The mode and basis of action of various insecticides, phenomena of biotransformation, selectivity, resistance, synergism and dosage-mortality relationships. Spring. Mr. Nakatsugawa.

*Prerequisite:* F Biol 330, or equivalent course in physiology or biochemistry.

720. INSECT ECOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab/field work. Interacting environmental factors which influence the relative abundance and distribution of forest insects, ecological principles as applied to problems in forest entomology, and pest management. Introduction to theories of population regulation and the study of the dynamics of forest insect population; individual problem and seminar. Fall Mr. Allen.

*Prerequisites:* F Ento 500, F Zool 520, or equivalents.

796. SPECIAL TOPICS IN FOREST ENTOMOLOGY

*Credit hours arranged according to nature of work*

Special instruction, conference, advanced study and research projects in the fields of insect toxicology, insect physiology, taxonomy of immature insects, phases of biology and ecology of insects. Typewritten report required in some fields. Fall & Spring. Staff.

797. SEMINAR

*1 credit hour*

Assigned reports and discussion of topics in entomology. Fall & Spring. Staff.

798. RESEARCH PROBLEMS IN FOREST ENTOMOLOGY

*Credit hours arranged according to nature of problem*

Comprehensive report required in some projects. Fall & Spring. Staff.

810. ADVANCED FOREST INSECT TAXONOMY

*3 credit hours*

Two hours of lecture, three hours of lab. Classification of the important groups of bark and wood boring forest insects. Fall. Staff.

*Prerequisites:* F Ento 500, F Ento 580, & F Ento 610.

880. HISTOLOGICAL TECHNIQUE

*3 credit hours*

One hour of conferences, six hours of lab. Methods used in preparation of insect material for microscopic study. Given in even calendar years. Spring. Staff.

*Prerequisites:* F Ento 500, F Ento 580.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## GENERAL FORESTRY

032 ORIENTATION *No credit*

One hour of lecture and discussion per week designed to introduce the freshman student to the College and its academic and social environs. Fall. Mr. H. Payne and Staff.

100. FOREST RESOURCES AND THEIR USE

*3 credit hours*

Lectures, recitation and a field study dealing with forest land, forest products and services and their use by man. The relation of forestry to other forms of land use and the multiple use of forest land are examined. The development of forestry in the United States and other countries is studied in its relation to the welfare of rural people and to the national economy. Fall. Staff.

502. INTERPRETING FORESTRY TO THE PUBLIC

*3 credit hours*

Two hours of lecture, three hours of lab. The principles of communication for forest extension and conservation education. The common audio-visual and printed-message media are covered. Specific topics include principles and techniques involved in lectures, demonstrations, exhibits, flip charts, slide talks, motion pictures, and television. Units of study concerning news coverage through the press, developing public relations and the role of information-education specialist in forestry, recreation and conservation are included. Spring. Mr. Hanselman & Staff.

550. RANGE MANAGEMENT

*2 credit hours*

Two hours of lecture, range ecology, animal husbandry, management practices and administrative aspects of range resources. Spring.

### 751. WORLD FORESTRY

*3 credit hours*

Three hours of lecture and discussion. Introduction to the principal features of the forest situation and major developments and problems in forest resource use that confront the world today. World politics and economics in relation to the availability and use of natural resources. World forest geography; forest resources and values, forestry policy and administration; world trade in forest products; current issues and problems. World forestry goals; international cöoperation in forestry; role of the United States in world forestry affairs. Fall or Spring. Mr. Larson. Open only to seniors and graduate students.

### 798. PROBLEMS IN WORLD FORESTRY

*Credit hours to be arranged*

Provides an opportunity for the student to pursue his study of forestry, or some phase thereof, in a global, regional or national (United States and Canada excluded) setting, and to gain experience in original thinking and analytical writing. Fall & Spring. Mr. Larson. For graduate students, primarily, in World Forestry.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## LANDSCAPE ARCHITECTURE

### *Graphics*

### 181. GRAPHICS I

*2 credit hours*

Six hours of studio per week. Two three-hour drafting room periods. Elements of perspective, isometric, oblique and orthographic projection. Practical applications of these principles in machine and architectural drawing, including piping, electrical, and plant layouts. Spring.

### 182. ART MEDIA I

*1 credit hour*

Three hours of studio per week. Studios, group instruction and demonstrations, individual critiques, sketching and drawing from model, from still life, and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition, and techniques in various black and white media. Fall.

### 183. ART MEDIA II

*1 credit hour*

Three hours of studio per week. Studio assignments, group instruction, and demonstrations, individual critiques, sketching and drawing from model, from still life, and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition, and techniques in various black and white media. Spring.

### 280. TECHNICAL DRAWING

*1 credit hour*

One three-hour drafting room period. Elements of perspective, isometric, oblique and orthographic projection. Practice in free hand and instrument drawing. Fall. Mr. Maraviglia.

### 281. LANDSCAPE ARCHITECTURAL DRAFTING

*3 credit hours*

One hour of lecture and six hours of studio per week. Lectures, readings and exercises through studio assignments in graphic techniques, including freehand and instrument drawing, drafting and lettering. Exposure to various graphic media, reproductive processes, axonometric, oblique and orthographic projections. Perspective, architectural, and topographic drawing. Spring.

### 284. ART MEDIA III

*1 credit hour*

Three hours of studio per week. Studios, field trips, group instruction, criticism and demonstration, painting in oil, water color, and acrylics. A studio painting course in oil, water, color, or acrylics to familiarize and develop color media skills and painting expressiveness. Fall.

*Prerequisite:* Gr 182 or 183 or permission of instructor.

285. ART MEDIA IV

*1 credit hour*

Three hours of studio per week. Laboratory-Studios, field trips, group instruction, criticism and demonstration; painting, sculpture, and other three-dimensional media. A studio course in various three-dimensional art forms and painting. Emphasis on individual experimentation and self-expression. Spatial relationships will be studied through the use of the third dimension, both from standpoint of "enclosure" and "setting." Spring.

*Prerequisite:* Gr 182 or 183, or permission of instructor.

382. GRAPHICS

*2 credit hours*

One hour of lecture and one hour of laboratory per week. Lectures, studio problems, and assigned reading. Study of the various graphic and three-dimensional techniques used to simulate the physical environment. Topics include multiview and perspective drawing, shades and shadows, model construction and interpretation. Fall.

*Prerequisite:* One semester of technical drawing or equivalent.

383. GRAPHICS

*2 credit hours*

One hour of lecture and one hour of laboratory per week. Lectures, studio problems, and assigned reading. Study of the various graphic and three dimensional techniques used to simulate the physical environment. Topics include the development of those subject areas introduced in Gr 382, and new areas related to various graphic media, reproduction processes, computer graphics, and techniques of animation. Spring.

*Prerequisite:* Gr 382 or equivalent.

580. OIL PAINTING–ACRYLICS

*1 credit hour*

Three hours of studio per week. Informal lectures, discussions, demonstrations, critiques, and individual easel work. Slides, notes, and field trips. Individually programmed painting course for self-expression and familiarization with methods, media, and techniques. Fall.

*Prerequisite:* Permission of instructor.

## *Environmental Influences*

113. INTRODUCTION TO ENVIRONMENTAL STUDIES

*3 credit hours*

Three hours of lecture per week. Lectures, assigned reading, movies, slides, discussion, papers. Discussion of the total spectrum of the physical environment; what man has done to adapt, alter, and influence the environment in which he lives. Comparison of the environmental concerns and influences of African, Oriental, and Western civilizations. Course will focus on environmental forms, uses, and problems, with special concern for the professions, sciences and arts which deal directly with the environment. Spring.

211. GENERAL GEOGRAPHY

*3 credit hours*

Three hours of lectures, assigned readings, written reports per week. Discussion of basic geographic concepts and methods, explanation of the significance of man-land relationships as exemplified through the regional distribution and spatial patterns of natural and cultural features, description of geologic processes and other physical features such as soils, climates and natural vegetation. Not open to geography or geology majors. Spring.

311. PRINCIPLES OF LAND USE

*3 credit hours*

Three hours of lecture, reports, assigned readings per week. Explanation of factors which influence the use, development, and control of land. Discussion of government's role in land development and control. De tailed consideration of unique values of land, competition for the use of space, planning for better land use, introduction to planning concepts and techniques, and other topics. Spring.

411. SOCIO–CULTURAL IMPACTS ON ENVIRONMENTAL DESIGN

*3 credit hours*

Three-hour lecture per week. Investigation and discussion of the social, cultural, economic, and political facets of a given foreign country as they effect the philosophy and practices of environmental design and landscape architecture. Bilingual readings, lectures, and discussions. Spring.

*Prequisites:* 4th-year status and registration in the School of Landscape Architecture Foreign Semester Program.

### 470. ART HISTORY

*3 credit hours*

Informal lectures and class discussion will emphasize and review assigned text and other readings and handout notes. Slides will be shown regularly, notebooks, reports, quizzes, and examinations. Evolutionary nature of the main cultural periods of Western man and fine art as man's selected environment will be the course emphasis. Fall.

### 471. HISTORY OF LANDSCAPE ARCHITECTURE

*3 credit hours*

Three hours of lecture per week. Informal lectures, and class discussion, notebooks, reports, assigned text, and assigned reserve shelf reading, optional text, and handout notes, weekly quizzes and exams. Slides. Historical study and style analysis of Western man's efforts to design his environment and his changing attitudes and relationships to environment. Also, non-Western coverage where significant or influential on Western Man. Study of historical personalities as well as periods that are of environmental concern up into the modern period. Spring.

*Prerequisites:* E I 470, or equivalent History of Arts course.

### 511. PRINCIPLES OF OUTDOOR RECREATION

*3 credit hours*

Three hours of lecture per week. Lectures, assigned readings, oral reports. Discussion of the importance of outdoor recreation in modern society and factors which contribute to the need for outdoor recreation. Description of types of recreational facilities and the organizations which provide them. Explanation of economic, social and political relationships in outdoor recreation. Fall.

*Prerequisites:* 4th year status or permission of instructor.

### 550. FUNDAMENTALS OF CITY AND REGIONAL PLANNING

*3 credit hours*

Three hours of lectures, assigned readings, written reports per week. Discussion of the meaning and purposes of city and regional planning. Examination of the historical development of urban places. Explanation of the principal elements of the comprehensive planning process, including goal formulation and decision making, social and advocacy planning, planning for community facilities, and planning administration. Discussion of the methods and objectives of city and regional planning. Fall.

*Prerequisites:* 5th year status or permission of instructor.

## Landscape Architecture

### 310. ELEMENTS OF LANDSCAPE ARCHITECTURE AND ENVIRONMENTAL DESIGN FOR ARCHITECTURE STUDENTS

*2 credit hours*

Two hours of lectures, discussions and assigned readings per week. A successive presentation of a landscape architectural philosophy toward the physical environment and environmental design. Presentation of operational systems involved in the physical environment from technical, functional and symbolic points of view. Fall.

*Prerequisite:* Enrollment in School of Architecture or permission of instructor.

### 311. ELEMENTS OF LANDSCAPE ARCHITECTURAL PRACTICE FOR ARCHITECTURE STUDENTS

*2 credit hours*

Two hours of lectures, problems, and assigned readings per week. An introduction to the design elements of Landscape Architecture in contemporary application and practice. Spring.

*Prerequisites:* L A 310; enrollment in School of Architecture or permission of instructor.

### 322. BASIC DESIGN

*2 credit hours*

One hour of lecture and three hours of lab per week. Lectures, studios, criticism, quizzes, exams, reports, composing and rendering finished abstract design plates and constructions. Course presents a theory of abstract design applicable to all graphic arts, and offers studio time in which to apply theory to graphic problems. Presented are the mechanics of design, design terminology, a basis of design criticism, and experience in basic design. Fall.

### 324. INTRODUCTION TO LANDSCAPE ARCHITECTURE

*3 credit hours*

Three hours of lecture per week. Lecture, and class discussion, notebooks, reports, assigned text reading and assigned reserve shelf reading, research reading, weekly quizzes and exams, slides, movies, and guest lectures, field trips. Course describes the field of Landscape Architecture, its background, philosophy, interdisciplinary relationships, its spectrum of interest, the human needs it responds to. It is not a course in design or design theory but in the background basis for landscape design. Fall.

### 325. LANDSCAPE DESIGN STUDIO I

*2 credit hours*

Six hours of studio per week. Studio assignments, drafting, readings, discussion, and field trips. An introduction to the visual-mental concepts basic to landscape architectural design. Various abstract problems to illustrate elements of the physical environment and their effect upon man. Special attention to the spatial context of these elements and spatial sequences characteristic of the natural and man-made environments. Spring.

*Prerequisites:* L A 324, L A 322, or permission of instructor.

Note: Student field trip expense $125-$150.

### 333. PLANT MATERIALS

*3 credit hours*

Three weeks of field trips and discussion during Summer Session. Ornamental woody plant identification. Observation and sketches of outstanding examples of planting design. Summer.

*Prerequisites:* F Bot 100, F Bot 210, and L A 322.

### 343. STRUCTURAL MATERIALS AND ELEMENTS

*3 credit hours*

Three hours of lectures, problems and assigned reading per week. Study of the physical properties of materials and structural elements commonly used in landscape architecture. Topics include elementary statics and strength of materials, wood, metal, plastics, concrete, masonry, retaining walls, dams, foundations. Spring.

### 345. ELEMENTS OF SITE ENGINEERING

*3 credit hours*

Two hours of lectures and three hours of studio per week. Lectures, problems, drafting, modeling, and assigned reading. The study of land form and its technical expression through grading plans, sections, profiles, layout plans, and earthwork quantity computation. Principles of soil mechanics and land drainage and their application to surface and subsurface drainage systems. Spring.

*Prerequisites:* F M 201 and E I 211.

### 420. LANDSCAPE DESIGN THEORY I

*2 credit hours*

Two hours of lectures, discussions, critiques, and assigned readings per week. A successive presentation of data on the physical environment beginning with the macroscape of nature to the intensively humanized urban site. Principles of basic organization of land areas, composition of elements, analysis of sites and programs, the process, purpose and implication of the practice of design. Fall and Spring.

*Prerequisite:* 4th year status or permission of instructor.

### 421. LANDSCAPE DESIGN THEORY II

*2 credit hours*

Two hours of lectures, discussions, critiques, and assigned readings per week. A successive presentation of data on the physical environment beginning with the macrospace of nature to the intensively humanized urban site. Principles of basic organization of land areas, composition of elements, analysis of sites and programs, the process, purpose and implication of the practice of design. Spring.

*Prerequisites:* L A 420 or permission of instructor.

### 422. LANDSCAPE DESIGN STUDIO II

*4 credit hours*

Twelve hours of studio per week. Studio problems, research, drafting, and field trips. The processes and methods of design considerations of variances upon the natural physical environment, ranging from broad regional areas to specific site concerns. Fall.

*Prerequisites:* L A 324, 325, 322, GR 382, 383, or permission of instructor.

### 423. LANDSCAPE DESIGN STUDIO III

*4 credit hours*

Twelve hours of studio per week. Studio problems, research, and drafting. Interaction of cultural influences with the physical environment, with attention focusing on the resulting forms. Observations and illustrations of people and places as inputs into the design process. Spring.

*Prerequisites:* L A 422 or permission of instructor.

### 430. PLANT MATERIALS CULTURE

*3 credit hours*

Three hours of field study and lectures per week. Trees, shrubs, vines and grasses. Identification; culture; common practices in pest and disease control. Fall.

*Prerequisite:* L A 333.

### 440. SITE DEVELOPMENT SYSTEMS

*3 credit hours*

Three hours of lectures, problems and assigned reading per week. Study of various engineering systems as they relate to the design and development of land. Topics include pedestrian ways, utilities (water, solid waste, sewage, electric, gas), road location and design, shore protection, swimming pools. Fall.

*Prerequisite:* Surveying.

### 463. ARCHITECTURE I

*3 credit hours*

One hour of lecture, six hours of studio per week. Introduction to the principles of architectural design and their application to project solutions. Traditional and contemporary structural systems and their effect on architectural form. Studio projects range from minor architectural elements associated with site design to more complex buildings. Practice in preparation of architectural drawings from preliminary design to working drawings. Spring.

*Prerequisites:* L A 343, 440, 420 and 422, or permission of instructor.

### 522. LANDSCAPE DESIGN STUDIO IV

*4 credit hours*

Twelve hours of studio per week. Studio problems, research, drafting, and field trips. Concentration on complex urban problems. Concern for social and psychological considerations of the individual and large groups of people, their interaction and resultant forms of the environment. Fall.

*Prerequisites:* L A 423 or permission of instructor.

*Note:* Student's expenses on an extended field trip approximately $125 to $150.

### 525. LANDSCAPE DESIGN STUDIO V

*4 credit hours*

Twelve hours of studio per week. Investigation of a problem in landscape architecture as proposed by the student and conducted in conjunction with faculty advisor. Spring.

*Prerequisite:* L A 522 or permission of instructor.

### 530. HERBACEOUS PLANT MATERIALS

*2 credit hours*

Two hours of lectures, study problems, assigned readings and field trips per week. Identification, understanding, and design use of non-woody plants. Fall.

*Prerequisite:* Permission of instructor.

### 532. WOODY PLANT MATERIALS

*3 credit hours*

Three hours of lecture per week. Field study, lectures, slide presentations and readings. An elective course providing opportunity for extension of basic knowledge in the identification and design of woody plant materials in professional practice. Fall or Spring.

*Prerequisites:* L A 333 and L A 430 or permission of instructor.

### 542. HIGHWAY LOCATION AND DESIGN

*3 credit hours*

Two hours of lecture, three hours of studio per week. Lectures, assigned reading, studio projects, field trips. Environmental, engineering and human factors which determine highway location and design, particularly as they relate to landscape architectural concerns. Location, alignment, geometric design, drainage, roadbed construction, pavements, roadside development. Fall or Spring.

*Prerequisites:* L A 343, 440 and 540, or permission of instructor.

### 544. PROFESSIONAL PRACTICE STUDIO I

*1 credit hour*

Three hours of studio per week. Studio problems, research, discussion on the processes and methods of office practice. Emphasis on architectural form and site structure relationships. Fall.

*Prerequisites:* 5th year status or permission of instructor.

### 545. PROFESSIONAL PRACTICE STUDIO II

*2 credit hours*

Three hours of studio, one hour of recitation per week. Studio problems, research, discussion and recitation sessions on the processes and methods of office practice. Emphasis on all aspects of site development. Spring.

*Prerequisites:* L A 544 or permission of instructor.

### 547. PRINCIPLES OF PROFESSIONAL PRACTICE

*2 credit hours*

Two hours of lecture per week. Lectures, assigned readings, reports, cost estimates, specifications, contracts, professional ethics, registration laws, professional practice. Spring.

*Prerequisite:* Upperclass standing.

### 561. ECOLOGICAL ARCHITECTURE

*3 credit hours*

One hour of seminar, six hours of studio per week. Study of special relationships of architectural form to predominantly natural environments, particularly parks and other recreation areas. A variety of studio projects involving program preparation, preliminary design and detailed drawings. Spring.

*Prerequisite:* L A 560 or permission of instructor.

### 562. ARCHITECTURE II

*2 credit hours*

Two hours of lecture per week. Discussion of the principles of architectural design and procedures of architectural practice. Functional building systems, coupled with site and program considerations as to their relative impacts on architectural form. Fall.

Prerequisite; L A 463 or permission of instructor.

### 597. LANDSCAPE ARCHITECTURE SEMINAR

*2 credit hours*

Two hours of seminar per week. Discussion of current social, political, cultural and technological problems as to their relationship to the physical environment. Fall and Spring.

*Prerequisite:* Permission of instructor.

### 720. LANDSCAPE DESIGN V

*4 credit hours*

Development of a major landscape design problem involving preparation of a series of related drawings. Fall. Staff.

*Prerequisites:* L A 522, L A 525.

### 721. LANDSCAPE DESIGN VI

*4 credit hours*

Continuation as described above. Further advanced project design similar to the work of L A 720. Spring. Staff.

### 730. PLANT MATERIALS IV

*2 credit hours*

Lecture, field work, trips. Special study of woody and herbaceous plant materials, greenhouse operation, and other horticultural practices. Spring. Mr. Viertel, Staff, and visiting lecturers.

731. PLANT MATERIALS

*3 credit hours*

Seminars, individual conferences, field trips, readings. Guided individual study in aspects of plant materials related to landscape architecture. Fall or Spring. Mr. Viertel.

*Prerequisite:* L A 730 or permission of instructor.

740. LANDSCAPE ARCHITECTURAL CONSTRUCTION

*3 credit hours*

Lectures, drafting. Detailed study of special landscape construction problems. Preparation of estimates, contracts, and specifications. Fall. Mr. Sears and Staff.

*Prerequisite:* L A 542.

750. CITY PLANNING

*3 credit hours*

Lectures, reports, assigned readings, and design. Architectural, aesthetic and engineering principles. One typewritten report (original and four carbons) required. Fall.

*Prerequisites:* L A 522, L A 525.

797. SEMINAR

*2 credit hours*

Discussion of miscellaneous current problems related to planning and management. Fall or Spring. Staff and visiting lecturers.

798. RESEARCH PROBLEM

*Credit hours arranged according to nature of problem*

Special study of assigned problems relating to landscape architecture or planning, with emphasis on critical thinking. Fall & Spring. Staff.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

## MANAGEMENT (FOREST MANAGEMENT)*

201. PLANE SURVEYING

*3 credit hours*

Two hours of lecture and recitation, three hours of field or office practice. A comprehensive development of the theoretical principles of plane surveying. Use of modern instruments and methods, computations related to forest activities. Fall. Staff.

*Prerequisite:* Plane Trigonometry.

303. INTRODUCTION TO FOREST MEASUREMENTS (SUMMER FIELD SESSION)

*1 credit hour*

Introduction to the concepts and practices of elementary field measurements necessary to forest survey and stand data preparation. Emphasis is given to field procedures, methods, and instruments, and to recognition of need for standards of performance. Summer Session. Staff.

340. HARVESTING

*2 credit hours*

Two hours of lecture. Principles of harvesting primary forest products. Equipment, methods, and economics of the logging industry. Spring. Mr. Koten.

497, FOREST MANAGEMENT SEMINAR

*3 credit hours*

Three hours of group discussion and analysis. Current literature, plans, and principles, and new developments in forest management. Fall. Staff.

498. PROBLEMS IN FOREST MANAGEMENT

*1 to 3 credit hours*

Independent study in special problems in Forest Management. The selection of a subject area will be determined by the student and an appropriate faculty member designated by the Department Chairman. A final written report is required for department records. Fall and Spring. Staff.

*Prerequisites:* Senior standing in Resources Management and permission of instructor.

522. MENSURATION

*3 credit hours*

Two hours lecture and discussion, one three-hour laboratory. Principles and methods of estimating and projecting net volumes of trees and products; tree form; timber volume determination of logs, trees and stands; growth determination; analyses by graphical and mathematical methods; stand structure adjustments; numerous problems. Spring. Mr. Cunia.

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*See also listings for Forest Engineering.

*Prerequisites:* AM 571 or AM 591; F Mgt 201 or F Engr 301.

### 540. ANALYSIS AND CONTROL OF FORESTRY OPERATIONS

*3 credit hours*

Two hours of lecture, three hours lab. Applications of scientific methods to management decision problems of forestry operations with emphasis on data sources and reliability, model formulation, inventory control, equipment replacement, simulation, and critical path scheduling and costing. Fall. Mr. Koten.

*Prerequisites:* AM 571 or equivalent, F Mgt 340 and computer programming.

### 552. MANAGEMENT PLANNING AND OPERATIONS

*3 credit hours*

Three hours of lecture and recitation. The over-all management and operation of a forest property as a productive enterprise, particularly development and expediting of cutting budgets, work plans, and operating schedules. Emphasis is on integration of principles and concepts of mensuration, silviculture, utilization, engineering, economics, administration, and human relations in the context of a practical operating land ownership. Spring. Mr. Horn.

### 554. FOREST ADMINISTRATION AND POLICY

*3 credit hours*

Three hours of lecture and recitation. Administrative and executive aspects of forestry. Public and private forest policy formulation; basic principles of organization, planning, public relations, personnel management, budget, and administrative practice. Work and organization of the major agencies engaged in forestry. Fall. Mr. Getty.

### 556. MANAGEMENT OF THE FOREST BUSINESS

*3 credit hours*

Three hours of discussion. Overview of major business management principles and methods of operation in forestry enterprises. Emphasis is on general business concepts which forest managers must use. Actual case studies are basis of instruction. Complementary to F Econ 511. Fall or Spring. Mr. Horn.

### 558. THE LAW OF NATURAL RESOURCE ADMINISTRATION

*3 credit hours*

Three hours of lecture-discussion. An introduction to the law concerning the procedures, powers, and judicial review of public agencies responsible for the management of natural resources. Topics will include the extent of an agency's rule-making power and the rights of aggrieved parties to appeal from agency decisions. Spring. Mr. Horn.

*Prerequisites:* F Mgt 554 or equivalent course in public administration.

### 560. MANAGEMENT PRINCIPLES AND PROCESSES

*3 credit hours*

Three hours of lecture. The principles of the art of managing manpower, providing greater depth in the concepts of management covered in F M 554. Network analysis methods of management planning. Evaluation of personnel. Human relations concepts. The processes of problem recognition and decision making, with consideration of the philosophical and qualitative elements of management science and information theory and their implications. Spring. Staff.

*Prerequisite:* F M 554 or permission of instructor.

### 561. OPERATION COST CONTROL

*3 credit hours*

Three hours lecture. Management uses of accounting data. Essentials of cost accounting and the uses and misuses of historical cost data in management decision making. Concepts of financial analysis of past and projected cash flows, and various methods of comparing alternatives. Fall. Mr. Palmer.

*Prerequisite:* Permission of instructor.

### 562. THE STRUCTURE OF MANAGEMENT DECISIONS

*3 credit hours*

Three hours of lecture. Introductory course in managerial decision making. Covers theory, concepts, and methodology of management practices and relates these to the realities of decision making. Uses the problem solving approach in preparing the prospective resource manager or administrator for an understanding of the application of decision-making models. Spring. Staff.

*Prerequisites:* F M 554 and A M 571 or equivalent and permission of instructor.

### 570. SOCIOLOGY OF OUTDOOR RECREATION

*3 credit hours*

Two hours lecture, three hours lab. Introduction to theory and research findings dealing with the sociological aspects of outdoor recreation: field work and lectures suggest administrative applications. Fall. Mr. D. Morrison.

*Prerequisite:* An introductory course in sociology or psychology; instructor's permission.

### 710. RESEARCH METHODS

*3 credit hours*

Instruction regarding methodology in the approach to and solution of problems in Forest Management research. Restricted to graduate students in Forest Management. Spring. Staff.

### 720. ADVANCED MENSURATION

*3 credit hours*

Systematic, stratified, and cluster sampling. Photo interpretation and double sampling. Ratio, Regression, and 3P Sampling estimates. Continuous Forest Inventory (CFI) and Sampling with Partial Replacement (SPR). Matrix Algebra applications to Multiple Regression and Weighted Least Square Method. Contribution of the error in Volume Tables to the error in the final average volume estimates. Forest Inventory and its place in the Woodlands decision-making. Optimum allocation of resources to sampling trees and plots in management inventory. Fall. Mr. Cunia.

*Prerequisites:* F Mgt 522, A M 565, A M 591, A M 595.

### 752. APPLIED FOREST MANAGEMENT

*3 credit hours*

Principles and practices of forest management as applied to specific forest properties under the guidance of responsible public and private foresters. Several days are spent in the field studying forest conditions, organizations, operations, and problems. By observing actual forest operations, students become acquainted with the latest and most efficient forest practices in office and forest. Fall. Mr. Horn.

### 754. ADVANCED FOREST ADMINISTRATION

*3 credit hours*

Critical appraisal of existing public, semi-public and private forestry agencies in the United States, and the comparative study of major administrative organizations and practices. Occasional inspection trips to forestry headquarters and field units and discussion of internal administrative problems with forest officers. Spring. Mr. Getty.

*Prerequisite:* F Mgt 554 or equivalent.

### 756. MANAGEMENT CONCEPTS IN PLANNING FOREST PRODUCTION

*3 credit hours*

Three hours of lecture-discussion. The theories and principles involved in planning the annual allowable cut and the resulting yearly cutting schedules. The influence of technical decision and socio-economic pressures upon the level of cutting and the effect of the level of cutting upon the dependent industry. Fall or Spring. Staff.

*Prerequisite:* F Mgt 552 or equivalent.

### 797. SEMINAR

*1 credit hour*

Group discussion and individual conference concerning current topics, trends, and research in management. Fall & Spring. Staff.

### 798. FOREST MANAGEMENT PROBLEMS

*Credit hours arranged according to nature of problem*

Hours to be arranged. Special study of assigned problems with emphasis on critical thinking. One typewritten report (original and one carbon) required. Fall & Spring. Staff.

### 851. OPERATIONS RESEARCH I

*3 credit hours*

Three hours of lecture. Mathematical methods applicable to the managerial process. The nature of mathematical modeling. Deterministic and statistical models. Stochastic processes, simulation, inventory control and queuing theory. Fall. Mr. Cunia.

*Prerequisites:* A M 591 or equivalent and Math 227 or equivalent.

852. OPERATIONS RESEARCH II

*3 credit hours*

Three hours of lecture. Continuation of F Mgt 851. Linear, quadratic and dynamic programming. Allocation and transportation problems. Game theory, competitive strategies and other operations research methods. Spring. (NOTE: Offered in Fall in 1970–71) Mr. Cunia.

*Prerequisite:* F Mgt 851.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## MATHEMATICS (COLLEGE OF FORESTRY COURSES)

115. PLANE TRIGONOMETRY

*3 credit hours*

Three hours of lecture. The course includes: the six trigonometric functions, the radian measure of angles, the variation and graphs of the trigonometric functions, the solution of right triangles and applications, trigonometric identities, trigonometric equations, inverse trigonometric functions, the general triangle, complex numbers, logarithms, and accuracy of computed results. Fall or Spring. Mr. Green.

116. COLLEGE ALGEBRA

*3 credit hours*

Three hours of lecture. The course includes a review of the axioms of algebra, the algebraic operations, inequalities, functions and their graphical representation, linear and quadratic functions, determinants, theory of equations, inverse functions, permutations, combinations and probability, the Binomial Theorem, mathematical induction, exponential and logarithmic functions and complex numbers. Fall or Spring. Mr. Green.

## PAPER SCIENCE AND ENGINEERING

300. INTRODUCTION TO THE PULP AND PAPER INDUSTRY

*1 credit hour*

Discussion of the historical modern development and management of the paper industry. Fall. Mr. O'Neil.

301. PULP AND PAPER PROCESSES

*3 credit hours*

Three hours of lecture. Introduction to pulp and paper technology with emphasis on pulping and bleaching. A study of the processes of pulping and bleaching of fibers including underlying theory. An introduction to formation and reactions of a fibrous web. Spring. Mr. Bambacht.

*Prerequisites:* Chem 332, F Chem 571.

302. PAPER PROCESSES LABORATORY

*1 credit hour*

One three-hour lab. Study and practice in the techniques of lab procedures normally encountered in the pulp and paper industry. Lab exercises selecting and using standard testing methods. Field trips to observe commercial equipment of the pulp and paper industry. Spring. Mr. Bambacht.

*Prerequisite:* PSE 301 (or concurrent).

304. MILL EXPERIENCE

*5 credit hours*

Twelve weeks full-time pulp or paper mill employment approved by the Department between the junior and senior years. Ordinarily, the student receives wages or salary while getting the required experience. The student must submit a comprehensive report to fulfill this requirement. An adaptability rating chart furnished by the Department is prepared by the mill for each student employed. Staff.

305. MILL INSPECTION REPORT

*1 credit hour*

One week inspection trip to representative manufacturers of pulp and paper, papermaking equipment, plastics, chemicals, or related products selected for demonstrating typical plant scale operations. Ultimate emphasis is on manufacture of pulp and paper. Daily discussions. Typewritten report required on termination of trip. Trip expenses are approximately $60 per student. Spring. Staff.

*Prerequisites or concurrent:* PSE 301, PSE 302, PSE 570, PSE 571, & PSE 573.

### 498. RESEARCH PROBLEM

*4 credit hours*

Twelve hours lab. The student is assigned a research problem in pulping, bleaching, refining, additives, quality control of paper or paper products or chemical engineering. The student must make a systematic survey of available literature on the assigned problem. Emphasis is on application of correct research technique rather than on discovery of results of commercial importance. The information obtained in the literature survey along with the data developed as a result of the investigation is assembled and evaluated and submitted in duplicate to his instructor. Spring. Staff.

*Prerequisites:* PSE 561, PSE 565.

### 556. ECONOMICS OF PULP AND PAPER

*2 or 3 credit hours*

Two or three hours of lecture and seminar. Structure and development of the industry and the decisions of management are explained in the light of economic principles. Current industrial trends and problems are discussed. Each student prepares an analytical report on some aspect of industry structure. Spring. Mr. Armstrong.

*Prerequisite:* F Econ 290 or equivalent.

### 561. PULPING TECHNOLOGY

*3 credit hours*

Two hours of lecture and three hours of lab. Discussion of pulping and bleaching processes: Effect of chemicals and physical variables on the wood components and pulp properties; chemistry involved. Experiments in pulping and bleaching, and pulp evaluation. Fall. Mr. Gorbatsevich.

*Prerequisites:* PSE 570, Chem 346 and Chem 356.

### 565. PAPER PROPERTIES

*5 credit hours*

Three hours of lecture, six hours of lab and discussion. Evaluation and study of the physical, optical, and chemical properties of paper and the interrelationships existing between paper manufacturing methods, papermaking additives, test results, and the ultimate properties desired in the finished paper. Fall. Mr. Strauss.

*Prerequisites:* PSE 301, PSE 302.

### 566. PAPER COATING

*3 credit hours*

Two hours of lecture, three hours of lab. Evaluation and study of the various coating processes and materials used by the paper industry to impart special properties to paper. Relationships of various components, flow properties of coating mixtures, and evaluation of their effect on coated paper properties will be studied. Spring. Mr. Strauss.

*Prerequisite:* PSE 565.

### 568. PAPERMAKING PROCESSES

*3 credit hours*

One hour of lecture, six hours of lab. Laboratory study of the papermaking process, with emphasis on operation of the semi-commercial Fourdrinier paper machine. Emphasis is on the fundamentals of stock preparation, paper machine operation, evaluation of the finished product, and the collection and analysis of data to develop material and energy balance. Results of each paper machine run are evaluated in seminar-type discussions. Spring. Messrs. Strauss, Gorbatsevich, & Stenuf.

*Prerequisites:* PSE 561, PSE 565, PSE 571.

### 570. PRINCIPLES OF MASS AND ENERGY BALANCE

*3 credit hours*

Three hours of lecture. Study of the properties of steam and solving problems connected with material and energy balances. Spring. Mr. Gorbatsevich.

*Prerequisites or concurrent:* Math 227, Physics, Chem 346, Chem 356, & Chem 333.

### 571. PULP AND PAPER UNIT OPERATIONS I

*3 credit hours*

Thee hours of lectures. The study of momentum, heat and mass transfer as applied to the design and operation of equipment for fluid flow, heat transfer, evaporation, humidity and air-conditioning. Emphasis is on the application of the fundamentals of these processes to the manufacture of pulp and paper. Fall. Mr. Stenuf.

*Prerequisite:* Chem 346, Chem 356.

### 572. PULP AND PAPER UNIT OPERATIONS LABORATORY I

*1 credit hour*

Three hours of lab. Lab study of fluid dynamics, heat transfer and evaporation. Emphasis is placed on the recognition of the important variables and on methods of evaluating them by experimentation and subsequent calculations. Specially designed semicommercial equipment is used. Fall. Mr. Stenuf.

*Concurrent:* PSE 571.

### 573. PULP AND PAPER UNIT OPERATIONS II

*3 credit hours*

Three hours of lecture. The study of momentum, heat and mass transfer as applied to the design and operation of equipment for sedimentation, filtration, drying, gas absorption, distillation and extraction. Emphasis is on the application of the fundamentals of these processes to the manufacture of pulp and paper. Spring. Mr. Stenuf.

*Prerequisites:* Chem 346, Chem 356, & PSE 571.

### 574. PULP AND PAPER UNIT OPERATIONS LABORATORY II

*3 credit hours*

Nine hours of lab. Lab study of humidity and air conditioning, drying, extraction, distillation, gas absorption, filtration, sedimentation, mixing, and other unit operations. Emphasis is placed on the recognition of the important variables and on methods of evaluating them by experimentation and subsequent calculation. Specially designed semicommercial equipment is used. Spring. Mr. Stenuf.

*Concurrent:* PSE 573.

### 577. PROCESS CONTROL FOR THE PAPER INDUSTRY

*3 credit hours*

Three hours of lecture. The study and application of measuring means, remote signal transmissions, and control elements. Response to signals, lag, dynamic error, cycling and other process control phenomena. The use of electronic computers in the paper industry. Applications of these principles and instruments to pulp and paper industry is stressed. Fall or Spring. Mr. Stenuf.

*Prerequisites or concurrent:* PSE 301, PSE 302, PSE 571, PSE 573, Chem 346, & Chem 356.

### 775. INDUSTRIAL THERMODYNAMICS

*3 credit hours*

The study and application of thermodynamics, including the first and second law, phase relationships, thermochemistry, the production of work and equilibrium relationships. Fall. Mr. Stenuf. Course given in even calendar years.

*Prerequisites:* Chem 346, Chem 356, or equivalent.

### 778. METALLURGY AND CORROSION FOR THE PAPER INDUSTRY

*3 credit hours*

Three hours of lecture. The study and application of metallurgy and corrosion for the Pulp and Paper Industries. Fall. Mr. Stenuf. Course given in odd calendar years.

*Prerequisites:* Chem 346, Chem 356, or equivalent.

### 796. SPECIAL TOPICS

*1 to 3 credit hours*

Lectures, conferences, and discussions. Advanced topics in chemical engineering, chemistry and physics as related to fibers, pulps and paper. Fall & Spring. Staff.

### 797. SEMINAR

*1 credit hour*

Discussions of assigned topics in fields related to pulp and paper technology. Fall & Spring. Staff.

### 798. RESEARCH IN PULP AND PAPER TECHNOLOGY

*Credit hours arranged according to nature of problem*

Hours to be arranged. Problems in pulp and paper technology are assigned to properly qualified graduate students. One typewritten report (original and one carbon) required. Fall & Spring. Staff.

Prerequisites depend upon nature of problem.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## RESOURCES MANAGEMENT

### 304. SILVICULTURE—RESOURCE MANAGEMENT (SUMMER FIELD SESSION)

*3 credit hours*

Field exercises designed to illustrate silviculture practices applied to forest stands, followed by a sequence of field trips, case studies and discussions introducing concepts and applications of multiple use in forestry. Consideration of the effects of ownership, forest conditions, economic factors and achieving management objectives. (Summer Session Staff)

### 502. RESOURCES MANAGEMENT

*3 credit hours*

The interrelationships between man and forest resources and the multiple services which those resources provide; the extent and nature of responsibilities of the forester to the community and to society in his stewardship of natural resources. Spring. Mr. P. F. Graves.

### 798. RESEARCH PROBLEMS IN RESOURCES MANAGEMENT

*Credit hours arranged according to nature of problem*

Special investigation and analysis of resource management problems where integrative relationships of several subject aspects of forestry are a major consideration. Fall & Spring. Staff.

## SILVICULTURE

### 302. SILVICS (SUMMER FIELD SESSION)

*1 credit hour*

Dynamics of forest development; the species and their several characteristics—including tolerance, growth, survival, and patterns of reproduction; species interrelationships; successional trends—effects on forest stand structure. Observation of forest responses following natural catastrophe, logging, clearing, or fire. Introduction to principles of forest cover manipulation by man. Staff.

### 324. GENERAL SILVICULTURE

*3 credit hours*

Three hours of lecture per week for first half of semester; two hours of lecture and three hours of lab or field work per week during second half of semester. Presentation of silvicultural concepts, principles, and practices. Not designed for biology or resource management majors. Spring. Staff.

*Prerequisite:* Junior standing.

### 332. SOILS

*2 credit hours*

Two hours of lecture. Fundamentals of soil science with particular reference to forestry. Fall. Mr. Craul.

### 333. SOILS LABORATORY

*1 credit hour*

Three hours of lab to be taken concurrently with, or with permission, subsequent to Silviculture 332. Laboratory aspects of soil with particular reference to forestry. Fall. Mr. Craul.

### 351. METEOROLOGY AND FIRE BEHAVIOR

*3 credit hours*

Lectures and recitations in atmospheric physics and the physics and chemistry of combustion lead to discussions of fire behavior and the strategy and tactics of fire suppression. Fall. Mr. Herrington.

*Prerequisite:* Physics 103 & 104 (Calculus helpful but not required).

### 497. SILVICULTURE SEMINAR

*2 or 3 credit hours*

Group study of selected silvicultural problems or situations of mutual interest. Emphasis is on critical evaluation and analysis and on organization and presentation of results from individual study for group consideration. Spring. Staff.

### 498. SPECIAL STUDIES IN SILVICULTURE

*1 to 3 credit hours*

Independent research in silviculture for selected undergraduate students. Selection of subject areas determined by the student in conference with appropriate faculty member.

Final written report is required for departmental record. Fall or Spring. Staff.

*Prerequisites:* Consent of instructor and department chairman.

### 520. APPLICATIONS OF ECOLOGY

*3 credit hours*

Three hours of lecture or discussion per week, or two hours of lecture and a three hour field trip per week. Examination of ecological concepts relevant to practices modifying terrestrial ecosystems for human benefit: seminar by specialists in selected fields of applied ecology, and student presentations-discussion-ecological implications of specific environmental design problems. Course designed primarily for advanced L A students but open to others. Fall or Spring. Mr. Richards.

*Prerequisites:* F Biol 320 or permission of instructor.

### 521. PRINCIPLES OF SILVICULTURE

*3 credit hours*

Three hours of lecture during the first half of the semester; two hours of lecture and three hours of lab during the second half of the semester. The forest as a community. Site factors and forest stand dynamics. Introduction to manipulation of forest cover to meet objectives of forest owners. Spring. Mr. Berglund.

*Prerequisites:* Summer Session in Field Forestry, F Bot 330 or F Bot 530 concurrently, or permission of instructor.

### 524. PRACTICES OF SILVICULTURE

*3 credit hours*

Two hours of lecture and one three-hour lab or field trip. Theory and practices of silvicultural manipulation of forest stands to gain objectives of the forest owner. Emphasis is on thinning, reproduction cuttings, planting, and other silvicultural operations in their relationships to economic and ecological factors. Fall. Mr. Farnsworth.

*Prerequisite:* Silvi 521 or permission of the instructor.

### 525. ADVANCED PRACTICES OF SILVICULTURE

*3 credit hours*

Four hours of lecture and seminar during the first half of the semester; six hours of field exercises thereafter. Development of silvicultural decisions in management of woodlands. Trips to forest areas. A cultural plan prepared to attain assigned objectives. Spring. Mr. Lea.

*Prerequisite:* Silvi 524.

### 526. PRINCIPLES OF REFORESTATION

*2 credit hours*

One hour lecture, three hours discussion, laboratory or field work. Elements involved in reforestation decision-making, including control of forest stand establishment through seeding or planting, seed production, handling and evaluation, seeding quality and nursery production, planting site evaluation and preparation. Course coordinated with Silviculture 525, together with which it provides broad coverage of silvicultural considerations in forest management. Spring. Mr. Richards.

*Prerequisite:* Silviculture 524 or equivalent.

### 528. REGIONAL STUDIES

*2 credit hours*

Two hours of lecture. Study and analysis of the many factors that influence the silvicultural management of the important tree species of North America. These factors include importance of forest and forestry to a designated region, physiography geology, soils, climate and weather, sites and site types, ecology, problems of protection and silvical characteristics of the more important species. Spring. Mr. Farnsworth.

*Prerequisite:* Silvi 524.

### 535. FOREST SOILS

*3 credit hours*

One hour of lecture, one hour of discussion, four hours of lab, field study of forest soils. Effect of silvicultural operations on soil. Selection of tree species for planting on different soils. Tree growth and development—soil properties relationships. Methods of soil sampling and laboratory analysis. Fall. Mr. Leaf.

*Prerequisites:* Silvi 332 & 333.

### 540. PRINCIPLES OF WATERSHED MANAGEMENT

*3 credit hours*

Two hours of lecture, three hours of lab. The relation of forest and range vegetation to its environment, and its effect upon soil and water. Measurement of precipitation, runoff, erosion and other variables. Fall & Spring. Mr. Eschner & Mr. Black.

### 541. SOIL AND WATER CONSERVATION

*3 credit hours*

Lectures and discussion of principles and methods of soil and water conservation. Spring. Mr. Black.

### 542. PRACTICE OF WATERSHED MANAGEMENT

*3 credit hours*

Two hours of lecture, three hours of lab. The impact of the multiple use of forest and range lands on water yield and soil stability. Regional problems and potential solutions. Spring. Mr. Eschner.

*Prerequisite:* Silvi 540.

### 552. PHYSICAL CLIMATOLOGY

*3 credit hours*

Three hours of lecture. Examination of the physical processes of the atmosphere as they relate to the exchange of heat, moisture, and momentum in the earth-atmosphere system. Emphasis on the meteorological and micrometeorological basis of climate and its interaction with the biological world. Spring. Mr. Herrington.

*Prerequisite:* Junior standing or permission of instructor.

### 577. FOREST TREE IMPROVEMENT

*3 credit hours*

Two hours of lecture, three hours of lab or field work. General principles and methods of tree improvement practiced in this country and abroad. Tree selection, techniques of vegetative propagation, hybridization, polyploidy, establishment of seed orchards, clonal and offspring testing and other problems. Spring.

*Prerequisite:* F Biol 570 strongly advised.

### 625. PRODUCTIVITY OF FOREST STANDS

*3 credit hours*

Examination of forest tree and stand production variables as related to silvicultural manipulation. Analysis of stand response, such as rate of growth, stem form, product quality, tree value and value. Preparation of stand treatment schedules. Spring. Staff.

*Prerequisite:* Permission of instructor.

### 677. ADVANCED FOREST TREE IMPROVEMENT

*3 credit hours*

Two hours lecture and discussion, three hours lab. A study of advanced principles and techniques for genetic improvement of forest trees. Special emphasis is placed on selection and breeding for growth rates, wood quality, and insect and disease resistance. Problems of tree hybridization, racial variation, sexual reproduction, and quantitative genetics in forest trees. Laboratory training in cytology and cytogenetics, pollen germination, vegetative propagation and other problems. Independent research problems will be undertaken by the student. Fall or Spring.

*Prerequisites:* F Biol 570, Silvi 577.

### 730. RESEARCH METHODS IN SILVICULTURE

*3 credit hours*

Three hours of lecture or discussion. Research concepts and methodology with particular application to silviculture and its related sciences. More appropriate to beginning students or before taking thesis work. Fall. Staff.

*Prerequisite:* Permission of instructor.

### 735. FOREST SOIL FERTILITY (APPLIED STUDIES)

*2 to 4 credit hours*

Two hours of lecture, one hour of discussion. None to six hours of lab depending on number of credit hours. Influence of soil fertility on development and growth of seedlings and trees, and techniques involved to determine this influence. Chemical and biological analysis to determine levels of soil fertility. Nutrient element deficiencies and their correction by soil amendments and fertilizers. Term projects by the student will be undertaken. Spring. Mr. Leaf.

*Prerequisites:* Chem 332 & 333, F Bot 530, Silvi 535, or equivalent.

### 737. PHYSICAL PROPERTIES OF FOREST SOILS

*2 to 4 credit hours*

Two hours of lecture and one hour of discussion, and none to six hours of lab depending on number of credit hours. Relations of soil physics to tree development, and techniques involved to determine this influence. Physical analyses to determine levels of soil moisture and aeration. Soil textural and structural properties of forested soils. Term projects by the student will be undertaken. Spring. Mr. Craul.

*Prerequisites:* Silvi 332, 333, 540, 535 or their equivalents.

### 750. MICROMETEOROLOGY

*3 credit hours*

Two hours lecture and three hours of lab. A comprehensive study of the physical processes taking place in the lowest layer of the atmosphere. Primary emphasis on the turbulent transfer of heat, momentum, and water vapor and the expression of these fluxes in the microclimate. Spring. Mr. Herrington.

*Prerequisites:* Silvi 552, Physics and Calculus.

### 777. QUANTITATIVE GENETICS IN FOREST TREE IMPROVEMENT

*3 credit hours*

Two-hour lecture and discussion, three hours lab. Development of statistical models for determining heritability in forest trees. Breeding models and computer analysis application in forest genetics. Fall or Spring.

### 797. GRADUATE SILVICULTURE SEMINAR

*1 credit hour*

Three hour class discussion per week. Assigned reports and discussion of silvicultural topics. Fall & Spring. Staff.

### 798. RESEARCH PROBLEMS IN SILVICULTURE

*Credit hours arranged according to nature of problem*

Hours to be arranged. Fall & Spring. Staff.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall and Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall and Spring. Staff.

## WOOD PRODUCTS ENGINEERING

### 304. INTRODUCTION TO FOREST PRODUCTS

*2 credit hours*

Two hours of lecture. Characteristics of the products of the forest tree and manufacture of wood products. Fall. Mr. E. Anderson.

### 322. MECHANICAL PROCESSING

*3 credit hours*

Two hours of lecture, three hours of lab. Primary log reduction methods and industry practices. Lumber grading. Wood cutting principles. Machining practice in secondary wood-using industries. Experience in the operation of certain primary and secondary machining equipment. Fall. Mr. Moore.

### 390. FIELD TRIP

*2 credit hours*

Two weeks supervised study and reporting of representative wood products industries. Spring. Staff. Required of all students in WPE. Estimated individual expenses are $100-150 while on the trip.

### 402. ELEMENTARY TIMBER MECHANICS

*3 credit hours*

Two hours of lecture, three hours of lab. Introduction to strength properties of wood, and wood products and other construction materials. Applications of these materials in typical construction problems. Fall. Mr. Kyanka.

*Prerequisites:* Senior standing or permission of instructor.

### 442. LIGHT CONSTRUCTION

*3 credit hours*

Two hours of lecture, three hours of lab. Elements of light frame construction, blueprint reading, and estimating. Fall. Mr. G. Smith.

### 486. ELEMENTARY WOOD TECHNOLOGY

*2 credit hours*

One hour of lecture, three hours of lab. Structure of wood in relation to defects, properties and uses. The variability of wood. Identification of major commercial U.S. timber by gross feature. Spring. Mr. deZeeuw & Staff.

### 487. WOOD STRUCTURE AND PROPERTIES

*4 credit hours*

Two hours of lecture, six hours of lab. Identification variability and anatomical characteristics of wood and paper-making fibers. Uses, properties and sources of wood and fibers. Structure of wood in relation to defects, properties, and uses. Fall. Mr. de Zeeuw & Staff.

*Prerequisite:* F Bot 100 or consent of instructor. Fall.

### 497. SENIOR SEMINAR FOR WOOD PRODUCTS ENGINEERING MAJORS

*2 credit hours*

Discussion and assigned reports in current problems and new developments in wood products engineering. Fall. Mr. Anderson & Staff.

### 498. RESEARCH PROBLEM

*1 to 3 credit hours*

Hours to be arranged. Conferences, library, lab and/or field research on a specific problem in wood products engineering. Typewritten report (original and one carbon) required. Fall and/or Spring. Staff.

*Prerequisite:* Consent of instructor.

### 502. TIMBER MECHANICS

*4 credit hours*

Three hours of lecture and three hours of lab second semester. Mechanical properties of wood and elements of structures. Lectures, problems, and use of timber-testing equipment. Spring. Mr. Kyanka.

*Prerequisites:* Calculus, Physics.

### 504. DESIGN OF WOOD STRUCTURAL ELEMENTS

*3 credit hours*

Lectures plus lab exercises. A development of the principles involved in designing structural elements in wood and practice in their application. Fall. Mr. Kyanka,

*Prerequisite:* WPE 502.

### 520. POLYMERIC ADHESIVES & COATINGS

*3 credit hours*

Two hours of lecture, three hours of lab. Physical and chemical properties of organic adhesives and surface coatings. Evaluation of application methods and performance on substrates. Spring. Mr. L. Smith.

*Prerequisite:* Junior standing.

### 522. COMPOSITE MATERIALS

*3 credit hours*

Two hours of lecture, three hours of lab. Manufacturing methods and physical properties of wood laminates, fiberboard, particleboard, plywood, paper overlays, sandwich materials, wood-polymer composites, and extruded and molded products. Fall. Mr. Moore.

*Prerequisites:* WPE 520, & WPE 526. Concurrent or prior registration in WPE 502 or 402.

### 526. FLUID TREATMENTS

*2-3 credit hours*

Two hours of lecture (2 credit hours), three hours of lab (1 credit hour). Steady-state and unsteady-state flow of liquids, gases, water vapor, and heat as related to wood structure, wood preservative and fire-retardant treatments. Laboratory studies in permeability measurement, impregnation of wood with liquids, dry kiln operation, and wood preservation. Spring. Mr. Siau.

*Prerequisites:* WPE 487 and WPE 322 (WPE 322 waived when only lecture is taken).

### 544. MATERIALS MARKETING

*3 credit hours*

Three hours of lecture and discussion. Organization and operation of wholesale and retail lumber distribution agencies, policies and problems. Principles of salesmanship and their application in the American lumber industry. Spring. Mr. G. Smith.

### 566. WOOD-WATER RELATIONSHIPS

*3 credit hours*

Two hours of lecture, three hours of lab. Consideration of basic wood-water relationships and the drying of lumber and other wood products. Fall. Mr. Skaar.

*Prerequisites:* Physics, calculus, WPE 526 or equivalent.

### 570. PRODUCTION MANAGEMENT OF WOOD WORKING INDUSTRIES I

*3 credit hours*

Two hours of lecture, three hours of lab. Production planning and control. Methods engineering. Organization and other aspects of management. Includes a comprehensive lab problem dealing with a proposed plan for establishing a woodworking plant. Fall. Mr. Whitt.

*Prerequisite:* Senior status.

### 572. PRODUCTION MANAGEMENT OF WOOD WORKING INDUSTRIES II

*3 credit hours*

Two hours of lecture and three hours of lab. Factory planning and design. Plant problems in production. Operations analysis. Spring. Mr. Whitt.

*Prerequisite:* WPE 570, senior status.

### 585. MICROTECHNIQUE AND PHOTOMICROGRAPHY

*3 credit hours*

One lecture and demonstration lab, one lab. Preparation of plant and animal tissue for sectioning. Techniques of embedding, sectioning, staining and mounting. Photography through the microscope. Film and print processing. Theory of the light microscope and brief introduction to electron microscopy. Fall. Mr. Côté.

*Prerequisites:* WPE 486 or WPE 487, & organic chemistry.

### 588. COMMERCIAL TIMBERS OF THE WORLD

*3 credit hours*

One hour of lecture, one hour of conference, three hours of lab, and assigned reading. Important commercial timbers of the world, their structure, physical properties, identification, supply and uses. Spring. Mr. deZeeuw.

*Prerequisite:* WPE 487.

### 596. SPECIAL TOPICS

*1 to 3 credit hours*

Lectures, conferences, discussions, recitations, problems, and laboratory. Special topics in wood products engineering: continuations, expansions, studies in depth, and new contemporary subject areas of concern to science or practice of wood products engineering. Fall and/or Spring. Staff.

*Prerequisite:* Consent of instructor.

### 702. ELASTICITY OF WOOD AND PLYWOOD

*3 credit hours*

Theory of elasticity as applied to solid and laminated wood, sandwich material, and plywood. Elements of wood plasticity. Spring. Mr. Davidson.

*Prerequisites:* WPE 502, Physics 203, & Physics 204.

### 796. ADVANCED TOPICS

*2 or 3 credit hours*

Lectures, conferences, discussions, and lab. Advanced topics in wood products engineering, including advanced studies in one or more of the basic areas covered in other courses in wood products engineering. Fall or Spring. Staff.

*Prerequisite:* Consent of instructor.

### 797. WOOD PRODUCTS ENGINEERING SEMINAR

*2 or 3 credit hours*

Conference, discussion and reports analyzing current research and new developments, new literature and subject matter surveys in wood products engineering. Fall & Spring. Mr. Anderson & Staff.

### 798. RESEARCH IN WOOD PRODUCTS ENGINEERING

*Credit hours arranged according to nature of problem*

Investigations on directed study in wood products engineering including manufacturing, marketing, anatomy, physics, quality and mechanical properties of wood. One typewritten report (original and one carbon) required. Fall & Spring. Staff.

### 860. ADVANCED WOOD PHYSICS

*3 credit hours*

Three hours of lecture. The physics of wood and wood-base materials. Treatment of wood-moisture relations with emphasis on movement of liquids and heat through wood. Derivation of the diffusion equations and their application to wood-treating and wood-drying processes. Spring. Mr. Skaar.

*Prerequisites:* WPE 566, Math 585.

### 880. INTERPRETATION OF CELLULAR ULTRASTRUCTURE

*2 credit hours*

One hour of lecture, two hours of demonstration and discussion. The organization and sculpturing of the walls of plant cells; the cellulose microfibril, matrix and incrusting substances, and the warty layer. The ultrastructure and general function of cytoplasmic organelles in cells. The tools and techniques used for light and electron microscopic study of cells, and the interpretation of structural evidence. Directed study and discussion of the latest (current) literature on pertinent topics. Spring. Mr. Côté.

*Prerequisites:* Permission of the instructor.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## FOREST ZOOLOGY*

### 100. GENERAL ZOOLOGY

*4 credit hours*

Prerequisite to all other courses in Forest Zoology. Three hours of lecture and recitation, three hours of lab. A general study of the animal organism, its development, structure, and function; and a survey of selected phyla with emphasis on the principles of taxonomy, distribution, genetics, evolution, and the role of animals in the forest. Spring. Mr. Van Druff.

### 200. WILDLIFE CONSERVATION

*3 credit hours*

Two hours of lecture, one hour of recitation. Introduction to the biological principles of conservation including the relationship of natural resources to modern society. The wildlife resource and its conservation will be emphasized. It is not open to students majoring in Forest Wildlife Management. Fall. Mr. Payne.

*Prerequisite:* One semester of biological science.

### 350. PRINCIPLES OF WILDLIFE MANAGEMENT

*3 credit hours*

Two hours of lecture, three hours of lab. A study of the principles governing management of forest and range wildlife and of the biological-economic-sociological mechanism involved. Spring. (Fall & Spring in 1970–71) Mr. Chambers.

*Prerequisite:* F Biol 320, or permission of instructor.

### 385. VERTEBRATE ANATOMY

*4 credit hours*

Three hours of lecture and recitation, three hours of lab. Comparative study of the anatomy of representative vertebrates, emphasizing structural, functional and developmental characteristics at both macro- and micro-levels. Fall. Mr. Graves.

### 511. INVERTEBRATE ZOOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Structure, classification, and probable descent of invertebrate animals. Emphasis on their relationships to the forest community. Spring. Mr. Dindal.

### 512. VERTEBRATE TAXONOMY

*3 credit hours*

Two hours of lecture, three hours of lab. Identification and classification of vertebrates of the forest community. Emphasis on the use of keys and recognition and significance of distinguishing characters. Spring. Mr. Alexander.

### 516. ICHTHYOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. An introduction to the anatomy, physiology, ecology, behavior and taxonomy of fishes. Spring.

### 520. TERRESTRIAL ANIMAL ECOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Relations of terrestrial animals to their physical, chemical and biological environment. Emphasis on community principles, succession, and terrestrial adaptations. Fall. Mr. Dindal.

*Prerequisites:* A course in ecology.

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*See also listings for Forest Biology.

### 523. INVERTEBRATE ECOLOGY

*2 credit hours*

Note: SUNY, Albany No. BIO 423

Two full days/week for four weeks. Study of terrestrial invertebrate micro-communities; descriptive and comparative assay of micro-habitats incorporating experimental and field techniques. Summer Session I, Cranberry Lake Biological Station. Mr. Dindal, College of Forestry.

*Prerequisites:* General biology, general ecology; invertebrate zoology is recommended.

### 524. VERTEBRATE ECOLOGY

*2 credit hours*

Note: SUNY, Albany No. BIO 425

Two full days/week for four weeks. Utilization of unique Adirondack forms and communities to study population dynamics, behavior, systematics and ecological role of vertebrates; standard field and laboratory techniques. Summer Session II, Cranberry Lake Biological Station. Mr. Rosenzweig, SUNYA.

*Prerequisites:* 12 hours of biology.

### 525. LIMNOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. An introduction to the ecology of inland waters. Emphasis on the lake as an aquatic habitat and the contained communities. Fall.

### 528. VERTEBRATE POPULATION ECOLOGY

*3 credit hours*

Two hours of lecture and one three-hour lab per week. Fundamental parameters of population structure and change with emphasis on vertebrate species. Fall or Spring. Mr. Chambers.

*Prerequisite:* A course in general ecology.

### 530. ANIMAL PHYSIOLOGY

*3 credit hours*

Three hours lecture. Principles of the processes of digestion, circulation, respiration, excretion, physiologic defense mechanisms, muscle contraction, electrophysiology, neural and endocrinologic regulation, and reproduction. Spring. Mr. Hartenstein.

*Prerequisite:* F Biol 330 or equivalent.

### 540. LAKE, POND AND STREAM MANAGEMENT

*2 credit hours*

One hour of lecture, three hours of lab. Principles and techniques of managing fisheries resources in fresh-water environments. Spring.

*Prerequisite:* F Zool 525.

### 550. METHODS OF WILDLIFE MANAGEMENT

*3 credit hours*

Two hour lecture, three hour lab. Field and laboratory techniques, with emphasis on demonstration and experience. One weekend trip is scheduled. Spring in 1970–71. Becomes Fall course again in 1971–72. Mr. Chambers.

*Prerequisite:* F Zool 350.

### 570. PRINCIPLES OF ANIMAL BEHAVIOR

*3 credit hours*

Three hours of lecture per week. A study of the basic principles of animal behavior, stressing the interplay of exogenous and endogenous control of behavior. Fall. Mr. Price.

*Prerequisite:* General Zoology.

### 580. COMPARATIVE HISTOLOGY

*3 credit hours*

Two hours lecture, three hours lab. An integrated and comparative survey of structure and function of tissues throughout the animal kingdom. Fall. Mr. Hartenstein.

*Prerequisite:* F Zool 330 or equivalent.

### 620. INVERTEBRATE SYMBIOSIS

*3 credit hours*

Two hours of lecture and one three-hour lab. An introduction to the ecology and evolution of interspecific relationships of invertebrates. Spring, even years. Mr. Dindal.

*Prerequisites:* F Bio 320, F Zool 511.

### 630. COMPARATIVE ENDOCRINOLOGY

*3 credit hours*

Three hours lecture. General endocrinology with emphasis on the comparative functions of endocrine glands of animals. Spring. Mr. Graves.

*Prerequisite:* F Zool 530 or equivalent.

### 670. VERTEBRATE BEHAVIOR

*3 credit hours*

Two hours lecture, three hours lab. Lecture, discussion and experimentation on the behavior of vertebrates, with emphasis on behavioral development, learning orientation, and social behavior. Spring. Mr. Price

*Prerequisites:* F Zool 570.

### 700. FOREST ZOOLOGY TRIP

*2 credit hours*

A 7 to 10 day trip to (1) agencies engaged in zoological research, management, and administration, or (2) regions or areas of unusual biological interest. A final report is required. Estimated student expense, $75.00. Fall or Spring. Staff.

*Prerequisite:* Instructor's permission.

### 725. ZOOGEOGRAPHY OF NORTH AMERICA

*3 credit hours*

Two hours of lecture, three hours of lab. Geographic distribution of North American vertebrates, factors determining their distribution and nature of range occupied. Fall. Mr. Webb.

### 750. ADVANCED WILDLIFE MANAGEMENT

*3 credit hours*

Two hours lecture, three hours lab. Advanced wildlife management with emphasis on regional and administrative wildlife problems. Extended trips (two weekend trips) are required. Fall. Mr. Chambers.

*Prerequisite:* F Zool 550 or permission of the instructor.

### 797. FOREST ZOOLOGY SEMINAR

*1 credit hour*

Two hours of discussion and assigned reports on current problems and new developments in forest zoology. Fall and/or Spring. Staff.

### 798. PROBLEMS IN FOREST ZOOLOGY

*Credit arranged according to nature of problem*

Hours to be arranged. Individual study of special problems in forest zoology. One typewritten report (original and one carbon) required. Fall or Spring. Staff.

### 830. ENVIRONMENTAL PHYSIOLOGY

*3 credit hours*

Two hours lecture, one hour discussion. An examination of the cellular, neural, and hormonal mechanisms and interactions whereby animals adapt physiologically to departures from steady-state conditions in their environment and life-history. Fall. Alternate years beginning 1969. Messrs Hartenstein & Graves.

*Prerequisites:* F Zool 630.

### 835. INVERTEBRATE PHYSIOLOGY

*3 credit hours*

Two hours lecture, three hours lab. A study of the physiologic mechanisms employed by invertebrates other than insects in coping with the exigencies of their environment. Fall or Spring. Alternate years. Mr. Hartenstein.

*Prerequisites:* F Zool 511 and F Zool 530.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 930. TOPICS IN VERTEBRATE ENDOCRINOLOGY

*2 credit hours*

Two hours lecture. A discussion of the current status of vertebrate endocrinology research. Spring. Mr. Graves.

*Prerequisites:* Graduate standing and F Zool 630 or equivalent.

### 950. TOPICS IN WILDLIFE BIOLOGY

*1 to 3 credit hours*

Hours to be arranged. Group study of a wildlife management topic. Fall or Spring. Mr. Chambers.

*Prerequisites:* Six credits of wildlife management courses.

### 970. TOPICS IN ANIMAL BEHAVIOR

*2 credit hours*

Two hours lecture and discussion. A seminar-type course designed to explore in depth selected and controversial subject areas in animal behavior. Fall or Spring. Mr. Price.

*Prerequisite:* F Zool 670 or equivalent.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

# X

# THE COLLEGE FACULTY

The date in parentheses after each name denotes the first year of service, two or more dates, the term of service. An asterisk (*) indicates graduate faculty.

## FACULTY EMERITUS

George J. Albrecht (1946–1968)
*Professor of Landscape Architecture; Director of School of Landscape Architecture*
B.S., New York State College of Forestry, 1930

Lawrence J. Belanger (1947–1965)
*Professor of Accounting; Registrar*
B.S., Syracuse University, 1932; M.S., New York State College for Teachers, Albany, 1941

Harold C. Belyea (1917–1956)
*Professor of Forest Management*
B.A., University of Mount Allison, 1908; M.A., 1911; B.Sc.F., University of New Brunswick, 1911; M.F., Yale University, 1916

Floyd E. Carlson (1930–1969)
*Professor, Public Service and Continuing Education*
B.S.F., University of Washington, 1928; M.F., 1930

Raymond F. Crossman (1942–1968)
*Professor of English; Dean of Students*
A.B., Syracuse University, 1926; M.A., 1931

James E. Davis (1947–1965)
*Professor of Forestry*
B.S., Cornell University, 1924; M.F., 1926

Carlyn C. Delavan (1923–1957)
*Professor of Forest Engineering*
A.B., University of Michigan, 1914; M.F.S., 1915

Wilford A. Dence (1920–1961)
*Professor of Forest Zoology*
B.S., New York State College of Forestry, 1920

James F. Dubuar (1919–1957)
*Director of Ranger School; Professor of Forestry*
A.B., University of Michigan, 1913; M.S.F., 1915

Carl C. Forsaith (1917–1959)
*Professor of Wood Technology*
B.A., Dartmouth College, 1913; M.A., Harvard University, 1914; Ph.D., 1917

Clifford H. Foster (1927–1959)
*Professor of Forestry*
B.S., New York State College of Forestry, 1921; M.F., 1922; M.S., Harvard University, 1924

Philip J. Haddock (1929–1970)
*Assistant Professor of Forestry, Ranger School*
New York State Ranger School, 1926

George H. Haines (1953–1968)
*Director of Business Affairs*
B.S., University of Rhode Island, 1932

William M. Harlow (1928–1965)
*Professor of Wood Technology*
B.S., New York State College of Forestry, 1925; M.S., 1926; Ph.D., 1928

Ray R. Hirt (1921–1959)
*Senior Professor of Forest Botany*
B.S., Hamline University, 1917; M.S., New York State College of Forestry, 1924; Ph.D., 1928

Raymond J. Hoyle (1918–1957)
*Professor of Forest Utilization*
B.S., New York State College of Forestry, 1917; M.S., Syracuse University, 1930

Ralph T. King (1937–1965)
*Professor of Forest Zoology*
B.S., Utah State Agricultural College, 1924; M.S., 1925

Orrin L. Latham (1930–1966)
*Associate Professor of Forestry*
B.S.F., Iowa State College, 1927; M.F., Yale University, 1932

Clyde Leavitt (1932–1943)
*Assistant Dean*
B.A., University of Michigan, 1901; M.S.F., 1904

Aubrey H. MacAndrews (1926–1962)
*Professor of Forest Entomology*
Truro Agriculture College, 1923; B.S., New York State College of Forestry, 1925; M.S., 1926

Henry F. A. Meier (1912–1914), (1929–1946)
*Professor of Forest Botany*
B.A., Indiana University, 1912; M.A., 1913; Ph.D., Columbia University, 1920

Lucian P. Plumley (1936–1967)
*Director of Ranger School, Professor of Forestry*
New York State Ranger School, 1931; B.S., New York State College of Forestry, 1935

John C. Sammi (1929–1967)
*Professor of Forest Management*
B.S., University of California, 1922; M.F., New York State College of Forestry, 1931

Hardy L. Shirley (1945–1967)
*Professor of Forestry; Dean*
B.A., Indiana University, 1922; Ph.D., Yale University, 1928; D.h.c., University of Helsinki, 1958; D.Sc., Syracuse University, 1966

LeRoy C. Stegeman (1929–1965)
*Professor of Forest Zoology*
B.S., Michigan State College, 1928; M.S., University of Michigan, 1929

Ralph G. Unger (1937–1964)
*Professor of Forest Extension*
B.S., New York State College of Forestry, 1930

Walter L. Welch (1950–1965)
*Associate Professor of Landscape Architecture*
A.B., Syracuse University, 1946

Harold G. Wilm (1953–1966)
*Professor of Forest Influences; Associate Dean*
B.S., Colorado College, 1929; M.F., Cornell University, 1930; Ph.D., 1932

Louis E. Wise (1919–1932)
*Professor of Forest Chemistry*
B.A., Columbia University, 1907; Ph.D. 1911

## COLLEGE FACULTY AND PROFESSIONAL STAFF

Roger F. Adams (1969)
*Research Associate, Polymer Chemistry, State University Polymer Research Center*
B.Sc., Sheffield University, 1965; Ph.D. 1968

Maurice M. Alexander (1949) *
*Professor of Forest Zoology; Chairman of Department*
B.S., New York State College of Forestry, 1940; M.S., University of Connecticut, 1942; Ph.D., State University of New York College of Forestry, 1950

Douglas C. Allen (1968) *
*Assistant Professor of Forest Entomology*
B.S., University of Maine, 1962; M.S., 1965; Ph.D., University of Michigan, 1968

David G. Anderson (1959)
*Assistant Dean for Administration; Associate Professor of Forestry*
New York State Ranger School, 1950; B.S., State University College of Forestry at Syracuse University, 1953; M.S., University of Utah, 1958

Eric A. Anderson (1950) *
*Professor of Wood Products Engineering; Chairman of Department*
B.S.F., University of Washington, 1932; Ph.D., State University College of Forestry at Syracuse University, 1949

George R. Armstrong (1950) *
*Professor of Forestry Economics*
B.S., State University of New York College of Forestry, 1949; M.S., 1959; Ph.D., 1965

ALAN L. AUGUST (1969)
*Assistant to the Director of Graduate Studies*
B.A., American University, 1964; M.A., Syracuse University, 1968

JAMES P. BAMBACHT (1967)
*Instructor, Paper Science and Engineering*
A.B., Kalamazoo College, 1954; M.S., The Institute of Paper Chemistry, 1956

ROBERT H. BAUM (1964) *
*Research Associate; Assistant Professor of Chemistry*
B.S., Cornell University, 1957; Ph.D., University of Illinois, 1962

DONALD F. BEHREND (1960–1967, 1968) *
*Research Associate, Director of Huntington Forest Wildlife Research*
B.S., University of Connecticut, 1958; M.S., 1960; Ph.D., State University College of Forestry at Syracuse University, 1966

JOHN D. BENNETT (1960) *
*Associate Professor of Forestry Economics*
B.A., Ohio Wesleyan University, 1954

JOHN V. BERGLUND (1965) *
*Assistant Professor of Silviculture*
B.S., Pennsylvania State University, 1962; M.S., 1964; Ph.D., State University College of Forestry at Syracuse University, 1968

C. ALLEN BICKFORD (1963) *
*Professor of Statistics*
B.S., Dartmouth College, 1925; M.S., University of Idaho, 1931

ALFRED H. BISHOP (1942)
*Associate Public Service Officer; Associate Professor, Public Service and Continuing Education*
New York State Ranger School, 1925; B.S., New York State College of Forestry, 1929; M.F., 1931

PETER E. BLACK (1965) *
*Associate Professor of Silviculture*
B.S., University of Michigan, 1956; M.F., 1958; Ph.D., Colorado State University, 1961

JOHANNA E. BOWEN (1968)
*Assistant Librarian*
B.A., University of Illinois, 1965; M.L.S., 1966

JEROME BREZNER (1961) *
*Associate Professor of Forest Entomology*
A.B., University of Rochester, 1952; A.M., University of Missouri, 1956; Ph.D., 1969

ROBERT H. BROCK, JR. (1967) *
*Associate Professor of Photogrammetry*
B.S., State University College of Forestry at Syracuse University, 1958; M.S., 1959

RANIER H. BROCKE (1969)
*Research Associate, Forest Zoology*
B.S., Michigan State University, 1955; M.S., 1957

HARRY W. BURRY (1962)
*Associate Public Service Officer (Wood Utilization Specialist); Associate Professor, Public Service and Continuing Education*
B.S., New York State College of Forestry, 1941; M.F., State University College of Forestry at Syracuse University, 1964

PAUL W. CALUWE (1969)
*Research Associate, Forest Chemistry*
M.S., University of Louvain, 1964; Ph.D., 1967

HUGH O. CANHAM (1966)
*Research Assistant, Forestry Economics*
B.S., State University College of Forestry at Syracuse University, 1960; M.S., 1962

DIANNE M. CAPRITTA (1967)
*Assistant Librarian*
B.S., University of Illinois, 1965; M.L.S., Syracuse University, 1967

RHONDDA K. CASSETTA (1967)
*Associate for Institutional Research*
A.B., Elmira College, 1933

DANIEL M. CASTAGNOZZI (1956)
*Associate Professor of Forestry, Ranger School*
New York State Ranger School, 1950; B.S.F., University of Michigan, 1952; M.F., State University College of Forestry at Syracuse University, 1957

R. Thomas Cerny (1970)
*Assistant Director of Admissions*
B.S., Springfield College, 1965; M.S., Springfield College, 1966

Robert E. Chambers (1967)
*Assistant Professor of Forest Zoology*
B.S., Pennsylvania State University, 1954; M.S., 1956; Ph.D., Ohio State University, 1967

Neils B. Christiansen (1960) *
*Associate Professor of Forestry Economics*
B.S., University of Idaho 1957; M.S., State University College of Forestry at Syracuse University, 1959; Ph.D., 1966

Rolla W. Cochran (1964)
*Assistant to the President for Community Relations; Associate Professor, Public Service and Continuing Education*
B.A., Denison University, 1949; M.S., Ohio State University, 1951

Jack B. Cody (1968)
*Senior Research Associate, Applied Forestry Research Institute*
B.S., University of Michigan, 1954; M.F., 1963

Harry J. Corr
*Director of Business Affairs*
B.S., Siena College, 1957

Wilfred A. Côté, Jr. (1950) *
*Professor of Wood Technology; Director of Ultrastructure Study Services*
B.S., University of Maine, 1949; M.F., Duke University, 1950; Ph.D., State University College of Forestry at Syracuse University, 1958

James E. Coufal (1965)
*Assistant Professor of Forestry, Ranger School*
B.S., State University College of Forestry, 1960; M.S., 1962

Philip J. Craul (1968) *
*Research Associate; Assistant Professor of Silviculture*
B.S.F., Pennsylvania State University, 1954; M.S., 1960; Ph.D., 1964

Tiberius Cunia (1968) *
*Professor of Forest Mensuration*
Forest Engineer, Ecole Nat. des Eaux et Forets, 1951; M.S., McGill University, 1957

George W. Curry (1966)
*Assistant Professor of Landscape Architecture*
B.A., Michigan State University, 1962; B.S., 1965; M.L.A., University of Illinois, 1967

Robert W. Davidson (1957) *
*Professor of Wood Products Engineering*
B.S., Montana State University, 1948; M.S., State University College of Forestry at Syracuse University, 1956; Ph.D., 1960

Russell C. Deckert (1952)
*Associate Public Service Officer (Wood Utilization Specialist); Associate Professor, Public Service and Continuing Education*
B.S.F., University of Georgia, 1938; M.F., Duke University, 1943

Carlton W. Dence (1951)*
*Research Associate; Associate Professor, Pulp and Paper Research*
B.S., Syracuse University, 1947; M.S., State University of New York College of Forestry, 1949; Ph.D., State University College of Forestry at Syracuse University, 1959

Carl H. de Zeeuw (1946)*
*Professor of Wood Products Engineering*
A.B., Michigan State College, 1934; B.S., 1937; M.S., New York State College of Forestry, 1939; Ph.D., State University of New York College of Forestry, 1949

Daniel L. Dindal (1966)*
*Assistant Professor of Forest Zoology*
B.S., Ohio State University, 1958; M.A., 1961; Ph.D., 1966

William A. Duerr (1952)*
*Professor of Forestry Economics; Chairman of Department*
B.S., Iowa State College, 1934; M.S., University of Minnesota, 1939; A.M., Harvard University, 1941; Ph.D., 1944

George F. Earle (1952)*
*Professor of Art*
B.F.A., Syracuse University, 1937; M.F.A. Yale University, 1946

Herbert E. Echelberger (1966)
*Adjunct Assistant Professor, Forest Management (U.S. Forest Service)*
B.S. Southern Illinois University, 1965; M.S. 1966

Andrew L. Eggers (1967)
*Media Engineer, Public Service and Continuing Education*

John H. Engelken (1959)
*Manager, Svend Oluf Heiberg Forest; Assistant Professor of Forestry*
B.S.F., Utah State University, 1950

Arthur R. Eschner (1961)*
*Professor of Forest Influences*
B.S., State University of New York College of Forestry, 1950; M.S., Iowa State College, 1952; Ph.D., State University College of Forestry at Syracuse University, 1965

C. Eugene Farnsworth (1930)*
*Professor of Silviculture; Chairman of Department*
B.S.F., Iowa State College, 1926; M. F. Yale University, 1928; Ph.D., University of Michigan, 1945

Alan D. Finnegan (1968)
*Director of Counseling; Assistant Director of Student Services*
B.S., St. Lawrence University, 1955; M.Ed., 1959

Jean E. Fisher (1963)
*Director, Ranger School; Professor of Forestry*
B.S., University of Idaho, 1941

Claude C. Freeman (1959)
*Assistant Professor of Landscape Architecture*
B.S., State University College of Forestry at Syracuse University, 1959

Robert L. Friedman (1967)
*Director of Admissions*
A.B., Syracuse University, 1952; M.A., 1954

William J. Gabriel (1968)
*Senior Research Associate, Applied Forestry Research Institute*
B.S., Michigan State University, 1964

Gerald M. Garthe (1967)
*Research Assistant, World Forestry*
B.S., University of Idaho, 1961; M.F., North Carolina State University, 1965

James W. Geis (1968)
*Instructor of Forest Botany*
B.S.F., University of Illinois, 1965; M.S. 1967

Russell E. Getty (1966)*
*Professor of Forest Management; Chairman of Department*
B.S., Iowa State College, 1936; M.S., 1951

William T. Gladstone (1968)*
*Assistant Professor of Silviculture*
B.S., New York State College of Forestry, 1953; M.F., Yale University, 1965; Ph.D., North Carolina, 1969

Serge N. Gorbatsevich (1956)*
*Associate Professor of Paper Science and Engineering*
B.S., State University College of Forestry at Syracuse University, 1954; M.S. 1955

Paul F. Graves (1947)*
*Associate Dean for Public Service and Continuing Education; Director of the School of Resources Management and College Forests; Professor of Forest Administration*
B.S., New York State College of Forestry, 1939; M.F., 1941; Ph.D., Syracuse University, 1950

William E. Graves (1967)*
*Assistant Professor of Forest Zoology*
B.S., University of Massachusetts, 1963; M.S., University of Wisconsin, 1965; Ph.D., 1967

Donald F. Green (1965)
*College Registrar; Assistant Director of Student Services; Associate Professor of Mathematics*
A.B., New York State College for Teachers, 1942; M.S., 1950

David H. Griffin (1968)*
*Assistant Professor of Forest Botany*
B.S., State University College of Forestry at Syracuse University, 1959; M.A., University of California, 1960; Ph.D., 1963

David G. Grimble (1968)
*Research Associate; Project Leader, Applied Forestry Research Institute*
A.A.S., Paul Smith's College, 1961; B.S., Michigan Technical University, 1964; M.F., University of Michigan, 1966

Austin F. Hamer (1968)
*Coordinator of Continuing Education; Associate Professor, Public Service and Continuing Education*
B.S., Oregon State University, 1942; M.S., University of Oregon, 1962

David L. Hanselman (1963)*
*Coordinator of Educational Communications; Associate Professor, Public Service and Continuing Education*
B.S., Cornell University, 1957; M.S., 1958; Ph.D., Ohio State University, 1963

Roy C. Hartenstein (1959–1965, 1967)*
*Professor of Forest Zoology*
B.S., State Teachers College at Buffalo, 1953; M.S., Syracuse University, 1957; Ph.D., State University College of Forestry at Syracuse University, 1959

Richard H. Hawkins (1968)
*Assistant Director of the State University Water Resources Center*
B.S., University of Missouri, 1957; B.S., 1959; M.S., Colorado State University, 1961; Ph.D., 1968

Robert D. Hennigan (1967)*
*Director, State University Water Resources Center; Professor of Water Resources*
B.C.E., Manhattan College, 1949; M.A., Syracuse University, 1964

Lee P. Herrington (1965)*
*Associate Professor of Meteorology*
B.S., University of Maine, 1959; M.F., Yale University, 1960; Ph.D., 1964

Thieo Hogen-Esch (1970)
*Visiting Assistant Professor of Forest Chemistry*
B.S., Leiden University, 1958; M.Sc., 1961, Ph.D., 1967

Bernard T. Holtman (1968)
*TV/Motion Picture Producer-Director, Public Service and Continuing Education*
B.A., Siena College, 1950

Allen F. Horn, Jr. (1957)*
*Associate Professor of Forest Management*
B.S., Michigan State University, 1950; M.S., 1951; Ph.D., State University College of Forestry at Syracuse University, 1957; L.L.B., Syracuse University, 1967

Terence J. Hoverter (1960)
*Librarian; Professor*
A.B., Fordham University, 1937; B.S., Columbia University, 1939; M.A., Fordham University, 1954

Edwin C. Jahn (1938)*
*Professor of Forest Chemistry*
B.S., New York State College of Forestry, 1925; M.S., 1926; Ph.D., McGill University, 1929

Hazel S. Jennison (1965)
*Research Assistant, Forest Chemistry*
B.S., Western Kentucky State College, 1941; M.S., Syracuse University, 1966

John W. Johnson (1970)
*Professor of Silviculture*
B.S., University of Michigan, 1946

James R. Johst (1967)
*Instructor of Landscape Architecture*
B.L.A., State University College of Forestry at Syracuse University, 1963; M.L.A., University of California, 1967

Ronald R. Karns (1965)
*Editor; Instructor, Public Service and Continuing Education*
B.S., Ohio State University, 1954

Joseph D. Kasile (1965)
*Assistant Professor of Forest Management*
B.S. Iowa State University, 1959; M.S., Oregon State University, 1960

EDWIN H. KETCHLEDGE (1955)*
*Professor of Forest Botany; Associate Director of Cranberry Lake Biology Station*
B.S., State University of New York College of Forestry, 1949; M.S., 1950; Ph.D., Stanford University, 1957

BERTRAM H. KNOUSE (1967)
*Associate Librarian*
B.S., University of Pennsylvania, 1950; M.L.S., State University of New York at Geneseo, 1965

DONALD E. KOTEN (1961)*
*Associate Professor of Forest Management*
B.A., North Central College, 1951; B.S., Oregon State College, 1957; Ph.D., State University College of Forestry at Syracuse University, 1966

MARTIN KRONMAN (1970)
*Adjunct Professor of Polymer Chemistry*
B.S., Rutgers University, 1950; Ph.D., Temple University, 1955

FRANK E. KURCZEWSKI (1966)*
*Associate Professor of Forest Entomology*
B.S., Allegheny College, 1958; M.S., Cornell University, 1962; Ph.D., 1964

GEORGE H. KYANKA (1967)
*Assistant Professor of Wood Products Engineering*
B.S., Syracuse University, 1962; M.S., Syracuse University, 1966

ROBERT T. LALONDE (1959)*
*Professor of Forest Chemistry*
B.A., St. John's University, 1953; Ph.D., University of Colorado, 1957

RICHARD W. LALOR (1953)
*Associate Professor of English*
B.S., New York State College for Teachers, Albany, 1941; A.M., Cornell University, 1946

JOHN E. LANGWIG (1968)
*Instructor of Wood Products Engineering*
B.S., University of Michigan, 1948; M.S., State University College of Forestry at Syracuse University, 1968

RONALD F. LAPLAINE (1953)
*Research Assistant, Paper Science and Engineering*

CHARLES C. LARSON (1950)*
*Director, Office of International Forestry; Professor of World Forestry*
A.S., North Dakota State School of Forestry, 1938; B.S., University of Minnesota, 1940; M.S., University of Vermont, 1943; Ph.D., State University of New York College of Forestry, 1952

RICHARD V. LEA (1946–56; 1967)*
*Associate Professor of Silviculture*
*Director of Summer Field Session*
B.S., New York State College of Forestry, 1946; M.S., State University of New York College of Forestry, 1948; Ph.D., State University College of Forestry at Syracuse University, 1953

ALBERT L. LEAF (1957)*
*Professor of Silviculture*
B.S.F., University of Washington, 1960; M.F., 1952; Ph.D., University of Wisconsin, 1957

CHARLES N. LEE (1959)*
*Professor of Forest Engineering, Director of Computer Center*
B.S., State University of New York College of Forestry, 1949; B.C.E., Syracuse University, 1957; M.C.E., 1959

RAYMOND E. LEONARD (1964)*
*Adjunct Assistant Professor in Watershed Management (U.S. Forest Service)*
B.S., University of Vermont, 1955; M.M.M., University of Helsinki, 1957; M.F., Yale University, 1964; Ph.D., State University College of Forestry at Syracuse University, 1967

BENGT LEOPOLD (1961)*
*Director, Empire State Paper Research Institute; Professor of Pulp and Paper Technology*
Civiling., Royal Institute of Technology, Stockholm, 1947; Tekn. lic. 1949; Ph.D., 1952

ALLEN R. LEWIS (1970)
*Assistant Professor of Landscape Architecture*
B.A., University of Oklahoma, 1959; M.C.P., University of California (Berkeley), 1961

JOSIAH L. LOWE (1933)*
*Research Professor of Mycology*
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PHILIP LUNER (1957)*
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B.Sc., University of Montreal (Loyola College), 1947; Ph.D., McGill University, 1951

J. DONALD MABIE (1967)
*Assistant Research Coordinator*
B.S., State University of New York at Albany, 1961

WALTER A. MAIER (1966)
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PAUL D. MANION (1967)*
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*Forester, Huntington Forest*
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RAYMOND L. MARLER (1970)
*Director, Applied Forestry Research Institute*
B.S., University of Michigan, 1948; M.F., University of Michigan, 1948

CHARLES E. MARTIN II (1962)
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B.S., Duke University, 1953; M.F., 1954

RENATA MARTON (1957)*
*Senior Research Associate; Professor, Pulp and Paper Research*
Master Ph. (Chemistry), Jagiello University, 1934; Ph.D., 1936

GEORGE F. MATTFELD (1965)
*Research Assistant, Forest Zoology*
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LARRY L. MCDOWELL (1964)*
*Research Associate, Forest Botany*
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JOHN A. MEYER (1963)*
*Senior Research Associate, Associate Professor Nuclear Chemistry Research*
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CHARLES R. MILLER (1966)
*Associate Professor of Forestry Economics*
B.S., State University College of Forestry at Syracuse University, 1958; M.F., Duke University, 1961; Ph.D., Michigan State University, 1966

HOWARD C. MILLER (1950)
*Associate Public Service Officer (Tree Pest Service), Associate Professor, Public Service and Continuing Education*
B.S., New York State College of Forestry, 1941; Ph.D., Cornell University, 1951

RICHARD W. MILLER (1966)
*Instructor of Forestry, Ranger School*
B.S., State University College of Forestry, 1956

LEON S. MINCKLER (1970)
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B.S., New York State College of Forestry, 1928; Ph.D., New York State College of Forestry, 1936

George Moeller (1968)
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U.S. Forest Service Cooperative Research Unit MS, So Ill., Aug '65

James O. Moore (1965)
*Manager, Computer Center*
B.M.E., Rensselaer Polytechnic Institute, 1960

Raymond A. Moore (1954)*
*Assistant Professor of Wood Products Engineering*
B.S.F., West Virginia University, 1951; M.S., North Carolina State College, 1952

Douglas A. Morrison (1969)
*Research Associate; Assistant Professor of Forest Recreation*
B.A., University of Western Ontario, 1966; M.S., University of Oregon, 1967; Ph.D., 1969

John L. Morrison (1946)*
*Professor of Forest Botany*
B.S., University of Nebraska, 1933; M.A., 1935; Ph.D., University of California, 1941

Tsunekata Naito (1969)
*Assistant Professor of Landscape Architecture*
B.A.F., Tokyo University of Arts, 1958; M.L.A., University of California, 1966

Tsutomu Nakatsugawa (1968)*
*Assistant Professor of Forest Entomology*
B. Agric., Tokyo University, 1957; M.S., Iowa State University, 1961; Ph.D., 1964

John D. Novado (1967)
*Editorial Associate, Public Service and Continuing Education*
B.A., Syracuse University, 1965

Ralph D. Nyland (1967)
*Senior Research Associate; Applied Forestry Research Institute*
B.S., State University College of Forestry at Syracuse University, 1958; M.S., 1959; Ph.D., Michigan State University, 1966

Frederic W. O'Neil (1937)*
*Professor of Paper Science and Engineering; Chairman of Department*
B.S., New York State College of Forestry, 1933; M.S., 1935

David G. Palmer (1966)
*Associate Professor of Industrial Engineering*
B.S., General Motors Institute, 1962; M.S., Syracuse University, 1964

Edward E. Palmer (1969)
*President*
A.B., Middlebury College, 1939; Ph.D., Syracuse University, 1949

Emiel D. Palmer (1962)
*Technical Specialist, Physical Sciences*
A.B., Syracuse University, 1928

Harrison H. Payne (1964)
*Dean of Students; Director of Student Services; Professor of Wildlife Conservation*
B.S., State University of New York College of Forestry, 1950; M.Ed., St. Lawrence University, 1955; Ed.D., Cornell University, 1963

Richard E. Pentoney (1953)*
*Associate Dean for Research; Director of the School of Physical Sciences; Professor of Wood Products Engineering*
B.S., University of California, 1949; M.S., State University of New York College of Forestry, 1952; Ph.D., State University College of Forestry at Syracuse University, 1956

Joseph J. Petraitis (1969)
*Assistant Librarian*
B.S., Villanova University, 1964; M.A., Syracuse University, 1966; M.L.S., Drexel Institute of Technology, 1968

Janis Petriceks (1968)
*Associate Professor of Forestry Economics*
Diploma, University of Freiburg, 1950; M.Agr., Interamerican Institute of Agricultural Sciences, 1956; Ph.D., State University College of Forestry at Syracuse University, 1968

SHELLEY W. POTTER, JR. (1956)
*Assistant Professor of Forestry; Manager, Pack Demonstration Forest*
New York State Ranger School, 1947; B.S., University of Michigan, 1951

EDWARD O. PRICE (1966)*
*Assistant Professor of Forest Zoology*
B.A., The College of Wooster, 1960; M.S., Michigan State University, 1963; Ph.D., 1966

WILLIAM PRINS (1970)
*Adjunct Professor of Polymer Chemistry*
Chem. Cand. University of Groningen, 1950; Ph.D., University of Leiden, 1955

JOHN R. REEVES (1966)
*Student Financial Aids Officer*
B.S., State University of New York at Cortland, 1960; M.S., Syracuse University, 1964

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KERMIT E. REMELE (1962)
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NORMAN A. RICHARDS (1963)*
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B.S., State University College of Forestry at Syracuse University, 1957; M.S., Cornell University, 1959; Ph.D., State University College of Forestry at Syracuse University, 1968

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MICHAIL SCHAEDLE (1965)*
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B.S., University of British Columbia, 1957; M.S., 1959; Ph.D., University of California, 1964

CONRAD SCHUERCH (1949)*
*Professor of Forest Chemistry; Chairman of Department*
B.S., Massachusetts Institute of Technology, 1940; Ph.D., 1947

BRADFORD G. SEARS (1941)*
*Professor of Landscape Architecture; Director of the School of Landscape Architecture*
B.S., New York State College of Forestry, 1939; M.S., State University of New York College of Forestry, 1948

ELWOOD L. SHAFER, JR. (1962)*
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JOHN F. SIAU (1963–1964, 1965, 1966)*
*Associate Professor of Wood Products Engineering*
B.S., Michigan State University, 1943; M.S., State University College of Forestry at Syracuse University, 1965; Ph.D., 1968

SAVEL B. SILVERBORG (1947)* [1]
*Professor of Forest Pathology*
B.S., University of Idaho, 1936; Ph.D., University of Minnesota, 1948

ROBERT M. SILVERSTEIN (1969)*
*Professor of Ecological Chemistry*
B.S., University of Pennsylvania, 1937; M.S., New York University, 1941; Ph.D., 1949

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[1] Sabbatic Leave 2/1/71–1/31/72

JOHN B. SIMEONE (1948)*
*Professor of Forest Entomology; Chairman of Department*
B.S., Rhode Island State College, 1942; M.F., Yale University, 1948; Ph.D., Cornell University, 1960

CHRISTEN SKAAR (1946–57, 1949)* [1]
*Professor of Wood Products Engineering*
B.S., New York State College of Forestry, 1943; M.S., State University of New York College of Forestry, 1948; Ph.D., Yale University, 1957

JOHANNES SMID (1956–57, 1960)*
*Professor of Polymer Chemistry*
B.Sc. Free University, 1952; M.Sc., 1954; Ph.D., State University College of Forestry at Syracuse University, 1957

GERALD H. SMITH (1946)*
*Professor of Wood Products Engineering*
B.S., New York State College of Forestry, 1937; M.B.A., Syracuse University, 1956

KENNETH J. SMITH (1968)*
*Research Associate; Associate Professor of Polymer Research*
B.A., East Carolina College, 1957; M.A., Duke University, 1959; Ph.D., 1962

LEONARD A. SMITH (1964)
*Research Associate, Wood Products Engineering*
B.S., Ch.E., University of Dayton, 1962; M.S., Ch.E., Case Institute of Technology, 1964

ERNEST SONDHEIMER (1957)*
*Professor of Biochemistry*
B.Sc., City College of New York, 1946; Ph.D., Cornell University, 1952

BRUCE T. STANTON (1946)*
*Professor of Forest Management*
New York State Ranger School, 1927; B.S., New York State College of Forestry, 1940; M.F., 1942

THEODORE J. STENUF (1960)*
*Professor of Paper Science and Engineering*
B.Ch.E., Syracuse University, 1949; M.Ch.E., 1951; Ph.D., 1953

ROGER W. STRAUSS (1955–1960, 1966)*
*Professor of Paper Science and Engineering*
B.S., State University of New York State College of Forestry, 1949; M.S., 1950; Ph.D., 1961

WILLIAM J. SULLIVAN (1966)
*Instructor of Forest Management*
B.S., Pennsylvania State University, 1960

VIVIAN R. SUTTON (1962)
*Associate Professor of English*
A.B., Oberlin College, 1934; M.A., Bryn Mawr, 1937; Ph.D., 1942

MICHAEL SZWARC (1952)* [2]
*Distinguished Professor of Chemistry; Director of State University Polymer Research Center*
Ch.E., Polytechnika Warzawska, 1932; Ph.D. (Organic Chemistry), Hebrew University, Jerusalem, 1942; Ph.D. (Physical Chemistry), University of Manchester, 1947; D.Sc., 1949; F.R.S. (London), 1966

HERBERT TEPPER (1962)*
*Professor of Forest Botany; Chairman of Department*
B.S., State University College of Forestry at Syracuse University, 1953; M.S., 1958; Ph.D., University of California, 1962

JAMES L. THORPE (1965)
*Research Assistant, Pulp and Paper Technology*
B.S., State University College of Forestry at Syracuse University, 1965

WILLIAM C. TIERSON (1961)
*Manager, Archer and Anna Huntington Forest*
B.S., State University of New York College of Forestry, 1949; M.F., State University College of Forestry at Syracuse University, 1967

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[1] Sabbatic Leave 8/1/70–1/31/71

[2] Sabbatic Leave 9/1/70–12/1/70

Tore E. Timell (1962)*
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Civiling., Royal Institute of Technology, Stockholm, 1946; Tekn. lic. 1948; Ph.D., 1950

William P. Tully (1966)
*Associate Professor of Civil Engineering*
B.S., Northeastern University, 1964; M.S., 1966

Frederick A. Valentine (1956)*
*Professor of Forest Botany*
B.S., St. Cloud State Teachers College, 1949; M.S., University of Wisconsin, 1953; Ph.D., 1957

Arthur T. Viertel (1946)*
*Associate Professor of Landscape Architecture*
B.S., New York State College of Forestry, 1942; Ph.D., State University College of Forestry at Syracuse University, 1954

Daniel C. Walton (1963)*
*Associate Professor of Biochemistry*
B.Ch.E., University of Delaware, 1955; Ph.D., State University College of Forestry at Syracuse University, 1962

Chun-Juan Wang (1959)*
*Associate Professor of Forest Botany*
B.S., Taiwan University, 1950; M.S., Vassar College, 1953; Ph.D., State University of Iowa, 1955

William L. Webb (1937)*
*Director of Graduate Studies; Professor of Forest Zoology*
B.S., University of Minnesota, 1935; M.S., 1940; Ph.D., Syracuse University, 1950

Wiley D. Wenger, Jr. (1965)
*Instructor of Forest Management*
B.S., Oregon State University, 1957; M.S., State University College of Forestry at Syracuse University, 1960

Sidney A. Whitt (1968)*
*Professor of Wood Products Engineering*
B.S., University of Alabama, 1933; M.S., Massachusetts Institute of Technology, 1937; Ph.D., New York University, 1962

Hugh E. Wilcox (1951)*
*Professor of Forest Botany*
B.S., University of California, 1938; M.S., New York State College of Forestry, 1940; Ph.D., University of California, 1950

David E. Wilkins (1966)
*Research Assistant, Forest Chemistry*

Peter F. Wiltsie (1968)
*Assistant Director of Business Affairs*
A.B., Utica College of Syracuse University, 1965

John M. Yavorsky (1948–1956, 1967)*
*Director of Office of Public Service and Continuing Education; Professor, Public Service and Continuing Education*
B.S., New York State College of Forestry, 1942; M.S., 1947; Ph.D., State University College of Forestry at Syracuse University, 1955

Robert A. Zabel (1947)*
*Associate Dean for Instruction; Director of the School of Biological Sciences; Professor of Forest Botany*
B.S., University of Minnesota, 1938; M.S., New York State College of Forestry, 1941; Ph.D., State University of New York College of Forestry, 1948

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## State University of New York

Office of the Chancellor, 8 Thurlow Terrace, Albany, N. Y. 12201

### UNIVERSITY CENTERS

State University at Albany
State University at Binghamton
State University at Buffalo
State University at Stony Brook

### MEDICAL CENTERS

Downstate Medical Center at Brooklyn
Upstate Medical Center at Syracuse

### COLLEGES OF ARTS AND SCIENCE

College at Brockport
College at Buffalo
College at Cortland
College at Fredonia
College at Geneseo
College at New Paltz
*College at Old Westbury
College at Oneonta
College at Oswego
College at Plattsburgh
College at Potsdam
*College at Purchase

*(The College at Old Westbury currently operates from temporary quarters in Oyster Bay, Long Island, while construction of its permanent campus proceeds. A second developing Arts and Science College at Purchase in Westchester County conducts special programs including joint operation of a Cooperative College Center in Mount Vernon. An upper-division Arts and Science College, to offer junior year through Master's degree courses of study, serves the Herkimer-Rome-Utica area. Evening courses are being offered in temporary facilities in the West Frankfort Elementary School, with construction of a permanent Campus in the Town of Marcy scheduled to begin in 1972.)

### SPECIALIZED COLLEGES

College of Forestry at Syracuse University
Maritime College at Fort Schuyler (Bronx)

### AGRICULTURAL AND TECHNICAL COLLEGES (Two-year)

Alfred
Canton
Cobleskill
Delhi
Farmingdale
Morrisville

### STATUTORY COLLEGES

College of Ceramics at Alfred University
College of Agriculture at Cornell University
College of Human Ecology at Cornell University
School of Industrial and Labor Relations at Cornell University
Veterinary College at Cornell University

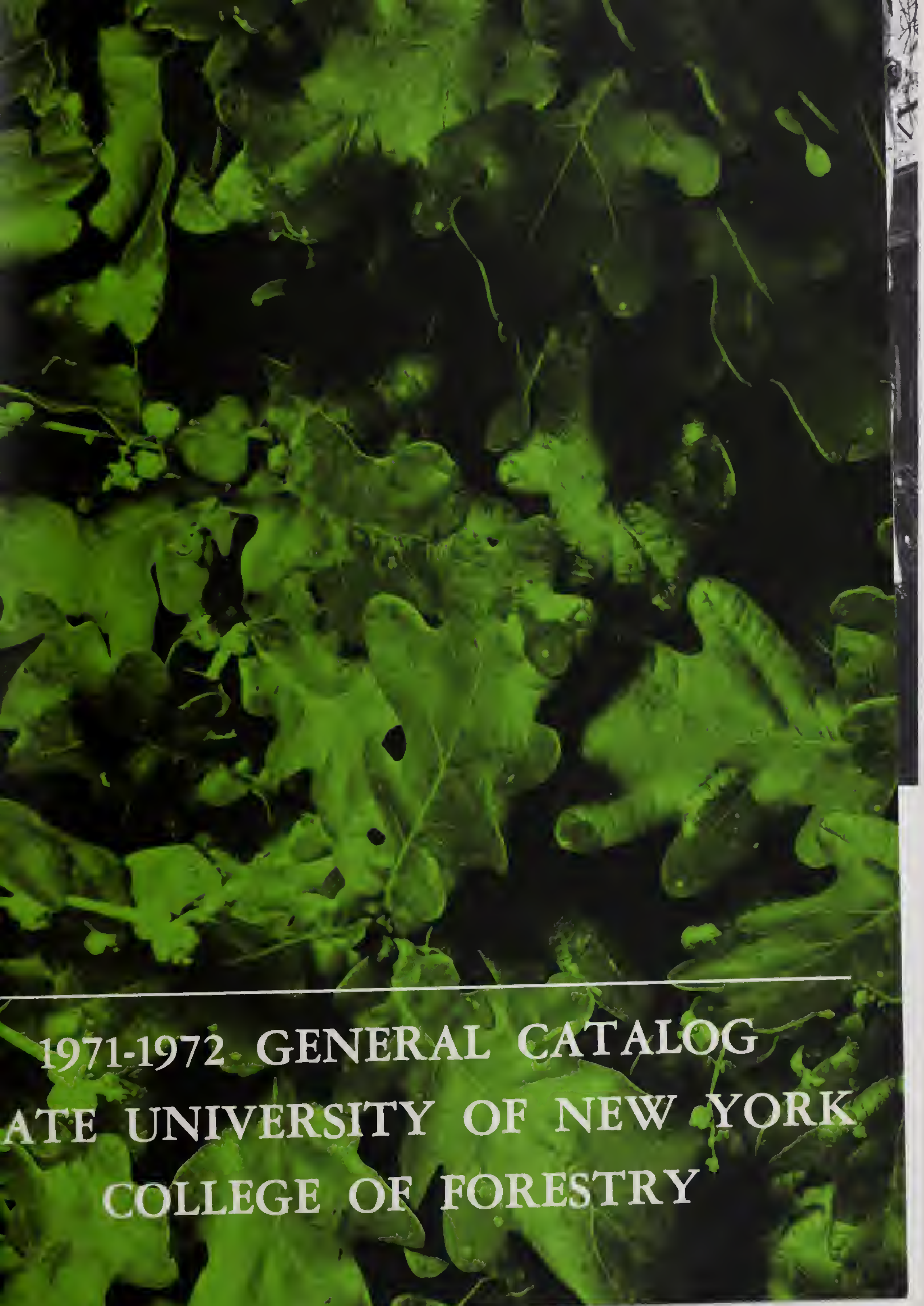
### COMMUNITY COLLEGES

(Locally-sponsored, two-year colleges under the program of State University)

Adirondack Community College at Glens Falls
Auburn Community College at Auburn
Borough of Manhattan Community College
Bronx Community College
Broome Technical Community College at Binghamton
Clinton Community College at Plattsburgh
Columbia-Greene Community College at Athens
Community College of the Finger Lakes at Canandaigua
Corning Community College at Corning
Dutchess Community College at Poughkeepsie
Erie County Community College at Buffalo
Fashion Institute of Technology at New York City
Fulton-Montgomery Community College at Johnstown
Genesee Community College at Batavia
Herkimer County Community College at Ilion
Hostos Community College in South Bronx
Hudson Valley Community College at Troy
Jamestown Community College at Jamestown
Jefferson Community College at Watertown
Kingsborough Community College
Mohawk Valley Community College at Utica
Monroe Community College at Rochester
Nassau Community College at Garden City
New York City Community College
Niagara County Community College at Niagara Falls
North Country Community College at Saranac Lake
Onondaga Community College at Syracuse
Orange County Community College at Middletown
Queensborough Community College
Rockland Community College at Suffern
Schenectady County Community College at Schenectady
Staten Island Community College
Suffolk County Community College at Selden
Sullivan County Community College at South Fallsburg
Tompkins-Cortland Community College at Groton
Ulster County Community College at Stone Ridge
Westchester Community College at Valhalla

(An eighth New York City community college, sponsored by the New York City Board of Higher Education, is in development.)

STATE UNIVERSITY O
LET EACH BECOME ALL HE IS CAP
ING
1948



# 1971-1972 GENERAL CATALOG
# ATE UNIVERSITY OF NEW YORK
# COLLEGE OF FORESTRY

# STATE UNIVERSITY OF NEW YORK

"The State University of New York—with more than 320,000 students on 70 campuses from Suffolk on Long Island to Fredonia in the west—stands proudly as an institution unparalleled in its development, unique in its diversity and increasingly looked to as a model of what the public university of the future must become."

In this manner, Chancellor Ernest L. Boyer, at his inauguration in April, 1971, described the State University of New York—America's largest university system and, at the age of 23, its youngest.

Since its founding in 1948, the State University has grown from 29 State-supported but uncoordinated campuses into an organized system of higher education comprising 72 institutions which enrolled 207,000 full-time and 114,000 part-time students in academic 1970–71.

Specifically, the University encompasses four university centers (two of which, Buffalo and Stony Brook, include health science centers); two medical centers; 13 colleges of arts and science; a non-residential college; three specialized colleges; six agricultural and technical colleges; five statutory colleges; and 38 locally-sponsored community colleges. Together, they offer students a choice of more than 3,100 academic specializations, representing more than 1,500 different degree programs. Twelve of the campuses offer graduate study at the doctoral level, 22 at the master's level.

Advanced degree study encompasses a wide spectrum, including agriculture, business administration, criminal justice, dentistry, engineering, forestry, medicine, nursing, optometry, pharmacy and veterinary medicine.

Four-year programs emphasize the liberal arts and science and include such specializations as teacher, education, business, forestry, physical education, maritime service, ceramics and the fine and performing arts.

The two-year colleges offer associate degree opportunities in arts and science and in technical areas such as agriculture, business, civil technology, data processing, police science, nursery education, nursing, medical laboratory technology and recreation supervision. The two-year colleges provide transfer programs within the University for students wishing to earn a baccalaureate degree.

Responding to the needs of New York State's economically and educationally disadvantaged citizens, the State University has also established six urban centers and six cooperative college centers. The former provide training for skilled and semi-skilled occupations as well as college foundation courses for youths and adults in inner-city areas. The latter combine the resources of public and private colleges within a region in a joint effort to prepare students for full-time college programs.

Diversity at the State University is further emphasized by its innovative approaches to education. Empire State College, the 72nd and newest institution, is a non-residential college whose students earn degrees without being attached to a specific campus or having to enroll in traditional courses. Its coordinating center at Saratoga Springs reaches out to students through regional learning centers which will be opened, eventually, at 20 locations throughout the State. In another approach, Upper Division College, presently located in temporary facilities outside of Utica, is designed exclusively for junior and senior year students and for those seeking master's degrees.

Ultimately responsible for the decisions which have led to the growth and diversity of the State University is its Board of Trustees. Appointed by the Governor, the Board determines the policies to be followed by all State-supported institutions of higher education, with the exception of the senior colleges of City University of New York. The Board's policies are administered by the Chancellor, the chief executive officer of the University.

While the 38 community colleges have their own local boards of trustees and the State pays only one-third of their operating costs and one-half of their capital costs, these two-year colleges operate under the University program.

It is a program which the Trustees and the Chancellor base on a fundamental principle and one which draws the vast and complex campus system into a single University: the improvement and extension of educational opportunities to citizens throughout the State.

The State University motto asserts that principle: "Let Each Become All He Is Capable of Being."

# 1971-1972
# GENERAL CATALOG

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## STATE UNIVERSITY OF NEW YORK
## COLLEGE OF FORESTRY

# STATE UNIVERSITY OF NEW YORK

## BOARD OF TRUSTEES

Mrs. Maurice T. Moore
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John L. S. Holloman, Jr.
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Mrs. Bronson A. Quackenbush
Herkimer

John A. Roosevelt .......Hyde Park

Oren Root ..........New York City

Roger J. Sinnott ..............Utica

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# COLLEGE OF FORESTRY

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## ACADEMIC CALENDAR

### *First Semester, 1971–72*

Dormitories Open......September 12 (8 a.m.)

Registration........September 13–15

Classes Begin..........September 16 (8 a.m.)

Middle of Term........November 4

Thanksgiving Weekend November 24 (12 m.)–November 29 (8 a.m.)

Christmas Recess.......December 18 (12 m.)–January 3 (8 a.m.)

Last Day of Classes......January 15

Final Examinations...January 17–26

### *Second Semester, 1971–72*

Registration..January 31–February 2

Classes Begin............February 3

Middle of Term ..........March 23

Spring Recess....March 24 (5 p.m.)–April 4 (8 a.m.)

Last Day of Classes..........May 20

Final Examinations..May 22–May 31

Commencement.............June 3

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# I

# THE COLLEGE GOALS

One-third of the land area of the United States is forested, and in many other countries, especially those just now developing industrial societies, the percentage is much higher. Efficient and wise use of forests, and related natural resources, requires an ever-growing number of scientists, engineers, managers and planners sensitive to social needs. The development, manufacture, and use of forest products and materials continue to accelerate in today's expanding technology. Creating a functional, pleasing, livable environment for man becomes increasingly important as population pressures build. It is a College goal to educate students in a wide spectrum of disciplines to fill professional positions in these fields, and to instill in these graduates a knowledge of their role and application in human affairs.

Research, the seeking of new facts, is a corollary of education, and is another major College goal. Research is a vital scholarly activity of the faculty, and helps provide a strong teaching base for undergraduate as well as graduate students.

Public service, the third major goal, has a history as old as the College itself. Using the same broad concept of forestry as is found in the classrooms, public education efforts range from the individual to mass audiences.

To accomplish these goals the College seeks capable, dedicated students who desire to acquire knowledge and to use this knowledge to assume responsible and creative positions in society.

It seeks to improve the environment for learning and research by providing modern, well-equipped classrooms, laboratories, and library facilities. It continually seeks to enhance the already distinguished faculty and supporting staff. It seeks to improve curriculums to meet changing science, engineering and social requirements.

The College strives to find more effective ways to reach the public, in order to be of greater service to individuals, industries, and all levels of government. And it strives to continue its role of leadership in natural resources higher education.

## II

## COLLEGE PROGRAMS AND FACILITIES

The College of Forestry was founded as a State College in 1911, and became a unit of the State University of New York when it was created by the Legislature in 1948. The central administrative offices of State University are in Albany. The President is the chief executive officer of the College, and is governed by policies established by the College of Forestry Trustees and the State University Trustees. Because of the cooperative relationship with Syracuse University, a close liaison is maintained with the Chancellor and other administrative officers.

Administratively, the College is organized into five schools which illustrate the variety of programs available to students. On the Syracuse campus the Schools are: Biology, Chemistry and Ecology; Environmental and Resource Engineering; Environmental and Resource Management; and Landscape Architecture. The fifth is the Ranger School, located at Wanakena, N. Y.

### ENVIRONMENT

The campus of the College adjoins that of Syracuse University on one of the hills which surround and overlook metropolitan Syracuse. The city, near the geographical center of New York, is the core of an urban and industrial region of nearly 450,000 population. Numerous manufacturing firms apply modern technology in electrical, chemical, mechanical, metallurgical, and biological fields. Major highways and rail, air, and bus lines, intersect at Syracuse.

Both the City of Syracuse and Syracuse University offer varied cultural and recreational opportunities, including exhibitions of paintings and sculpture, recitals and concerts, amateur and professional theater, dance and cinema, lectures in the humanities, forums and addresses by political and social scientists. The annual Arts Festival is among the special attractions of the campus.

Among the city's cultural assets are the Syracuse Symphony Orchestra and the Everson Museum of Arts of Syracuse and Onondaga County, both with a fine philosophy of community service and participation.

Recreation opportunities are varied because of the central New York climate and geography. General facilities for winter and summer sports are enjoyed by residents and students. The City of Syracuse and Onondaga County have extensive park systems, and State Parks are nearby. The Finger Lakes Region begins 18 miles away, and the Thousand Islands are 90 miles from Syracuse. The Adirondack and Catskill Mountain Parks and Niagara Falls are within 150 miles.

## CAMPUSES

Bray Hall, Marshall Memorial Building, Baker Memorial Wood Products Laboratory, Illick Hall, Moon Memorial Library, and Walters Hall are the principal buildings.

Off-campus facilities include nearly 25,000 acres of forest land at five locations used for instruction, demonstration, research, and public service. A tree nursery and small arboretum are included in the total. At the Huntington Wildlife Forest in the Central Adirondack Mountains, an Ecological Center has just been completed. The Charles Lathrop Pack Demonstration Forest is the site of Cranberry Lake Biology Station where a summer session in environmental biology is conducted along with forest and environmental research. A complete sawmill operation is carried out at the Pack Demonstration Forest, near Warrensburg.

On the campus are the following institutes and centers: Cellulose Research Institute, Empire State Paper Research Institute, State University Polymer Research Institute, and the Applied Forestry Research Institute. A research center of the U. S. Forest Service is also at the College.

The College is extensively furnished with modern equipment and instruments for instruction and research in its major subject areas. These include electron microscopes, plant growth chambers, air conditioned greenhouses, an animal environmental simulating chamber, a bio-acoustical laboratory, a 1,000-curie cobalt-60 radiation source, radioisotopes laboratories, computer center, and specialized instrumentation including nuclear magnetic resonance, electron spin resonance, mass spectrometer, ultracentrifuge, x-ray and infra-red spectro-

photometer. Photogrammetric and geodetic facilities include one of the most extensive arrays of equipment in the U. S., with a Nistri TA-3 stereocomparator, Mann comparator, computerized Nistri photocartograph, and nine other varieties of plotters. The paper science and engineering laboratory has a semi-commercial paper mill with accessory equipment. The greenhouses and forest insectary are used to produce plant and insect material for classroom and laboratory. Extensive collections are available for study, including wood samples from all over the world, botanical materials, insects, birds, mammals, and fishes.

## PROFESSIONAL EDUCATION

The College provides instruction for professional work in eight, four-year curriculums, some of which contain optional programs. Each leads to the Bachelor of Science degree. In the case of one, a fifth year leads to the Bachelor of Landscape Architecture degree. Most undergraduates enter at the freshman level, but the number of transfer students entering at the sophomore and junior levels is increasing.

Graduate study, leading to the Master's degree and Doctor of Philosophy degree, began when the College was founded. The first advanced degree was awarded in 1913. Since then graduate enrollment has increased steadily and averages 20 per cent of the registration. More than 1,000 advanced degrees have been awarded by the College. Graduate students choose among many fields of forestry, forest products, and their supporting science disciplines for their work toward a degree. Each year the College awards a number of scholarships, fellowships, and assistantships to degree candidates. (See page 71 for Graduate Study.)

## TECHNICAL EDUCATION

The College has been training men for technical forestry work since 1912 at the Ranger School at Wanakena, N. Y. It is situated on 2,680 acres of forested land near Cranberry Lake in the Adirondack Mountains. The school offers a two-year Associate in Applied Science degree program in practical forestry at the technician level, training individuals for positions as state forest rangers, federal and state forest technicians and forestry aides, company district supervisors, timber inventory specialists, timber sales supervisors, forest surveyors and engineering aides, forest protection technicians, and others.

The program of study and field work at the Ranger School is practical and intensive, and deals with such activities as forest surveying, timber estimating, mapping, log and pulpwood scaling, tree identification, forest improvements, logging, silviculture, aerial photogrammetry, and wood identification.

Additional information can be obtained from the College Admissions Office, or the Director, College of Forestry Ranger School, Wanakena, N. Y. 13695.

## PUBLIC SERVICE AND CONTINUING EDUCATION

The College serves the public through its Office of Public Service and Continuing Education with public education a responsibility of all faculty members. The Office coordinates efforts to provide information, advice and guidance to specialized local, state and federal agencies, to the forest and wood-using industries, and to the general public on matters relating to the conservation and use of New York's forest resources.

Continuing education programs are designed to serve needs in three broad areas: refresher programs to up-date professionals at various levels of responsibility; more comprehensive programs of an interdisciplinary nature to improve decision-making premises for resource managerial and supervisory personnel; and informational programs aimed at better recognition of basic relationships and impacts between land, resources, and society, for lay and community leaders involved in planning and stewardship.

Various media and programs are used for off-campus public service endeavors. These include a Wood Utilization Team for wood-using industries, a motion-picture film library with supporting production facilities, and a wide range of publications, both technical and popular, on forestry topics.

In addition, mass communications techniques are used to reach the public with certain types of information, including radio and television, exhibits, a speakers' bureau, tours, newspapers, magazines, and trade journals.

Requests for public education services should be sent to: Dean, Public Service, Continuing Education and Educational Communications, State University College of Forestry, Syracuse, N. Y. 13210.

## RESEARCH

Research is one of the prime endeavors of the College, and is of greatest interest to entering graduate students; but the seeking of new knowledge contributes to the academic enterprise throughout the College. Instruction, public service and research are mutually beneficial at a professional institution, and it has been through these channels that the College has achieved its well-rounded and balanced program.

## STUDENTS AND FACULTY

Education in the classroom, laboratory, and field is a cooperative endeavor between students and faculty, and is an enriching experience for both. This two-way communication is traditional at the College, so much so that Deans and Department Chairmen, with considerable administrative responsibilities, still meet classes and consider it a privilege to do so.

Men and women are accepted as students at the College, and at present number 1,766. Of these 1,426 are undergraduates and 340 are graduate students.

In addition there are 24 post doctorates. A growing number of students at the College transfer here from community colleges and other institutions. Transfers can be effected in February as well as September. International students, both undergraduate and graduate, are encouraged to apply for admission. For detailed information on procedures refer to How To Apply For Admission on page 32, and Graduate Study on page 71.

The teaching and research staff of the College is comprised of 162 faculty. Selected professors are designed as graduate faculty, but they also teach undergraduate courses and are available for undergraduate consultations. Many of them serve as advisors to undergraduates which is particularly helpful to students seeking advanced degrees.

## LIBRARY

The F. Franklin Moon Library contains approximately 60,000 cataloged items and receives more than 775 current journals. There is substantial coverage in the areas of ecology, forest botany and pathology, forest chemistry, forest economics, forest management, forest zoology, landscape architecture, paper science and engineering, polymer chemistry, silviculture, soils sciences and wood products engineering. These are supplemented by large collections in the environmental resource field. Additional strength is found in the comprehensiveness of abstract and indexing services relevant to the College's programs. The Library also offers a selected and broad choice of general interest reading material.

Interlibrary loan privileges with institutions throughout the U.S. and Canada are extended to qualified researchers. Accessible to faculty and students are diversified resources of the Libraries of Syracuse University, State University Upstate Medical Center and the special scientific libraries of industrial companies located in the Syracuse area.

The new library building provides a main reading area in the center of the upper level. Surrounding the reading area are open stacks, a Current Periodicals Room and a Bibliographic Center. The Reserve Book Room, Special Collections Room, Archives and Conference Rooms are located on the lower level.

## III

## YOU AND THE COLLEGE

How can you best prepare for a professional career and a lifetime that will last well into the 21st century? This is the question facing you, a high school graduate, as you consider a college education. While the future is full of uncertainty and challenge, you can be sure that the role of the scientist, the engineer, the manager, and the landscape architect will expand during the years ahead.

Forestry as generally understood means the wise, continuous use of forests and their products for human benefit. Managing forest resources for optimum yields of timber and wood products, plentiful supplies of water, and abundance of wildlife, natural beauty, attractive recreational environments, and other services and products is a major responsibility of foresters.

Forest products industries, including wood processing, wood products manufacturing and marketing, pulp and paper, and the cellulosic products, rank high in the nation's economy. All require many wood products engineers, marketing specialists, and pulp and paper specialists to design and direct their operations, to merchandise their products, and to conduct developmental and basic research. Broad opportunities in the synthetic fiber, film, lacquer, plastics, dissolving pulp and other cellulosic and polymer industries are available for chemists with training in wood and polymer chemistry.

Biological sciences serve a vital function to both forestry and forest products, and special curriculums have been developed at the College that recognize these relationships.

Landscape architecture is a profession that deals with the development of land areas for both aesthetic and functional purposes. In recent years it has assumed great importance in the fields of land use planning and recreation.

The demand for men and women specializing in forestry and associated resources, forest products and materials, and landscape architecture, exceeds the supply. Since you are considering the College of Forestry, we can assume that you have decided on a science oriented or environmentally oriented education. But it may be helpful to you if we briefly explain the major fields of specialization available at the College. More detailed information on undergraduate curriculum is found beginning on page 37. Information on graduate study is given in Chapter VII, beginning on page 71.

## FOREST BIOLOGY

The forest biology curriculum provides a basic education in biology, presenting and integrating modern concepts in the molecular, cellular, organismal, and environmental areas of biology. It places emphasis on forest organisms, the forest environment, and provides an orientation to forestry principles. The curriculum primarily prepares students for graduate study in biological areas basic to understanding and using renewable natural resources, such as botany, forest pathology, forest entomology, silviculture, wildlife biology, or zoology. It also qualifies students for a broad range of federal, state, and private biology positions related to natural resources including wildlife biology, insect and disease control, and environmental biology.

## FOREST CHEMISTRY

Recent developments of the science of polymer chemistry have had a profound impact on the study of forest products, for it has increased the knowledge of the chemical nature of wood, which is a mixture of natural polymers. Many fundamental problems related to life processes are also being investigated by chemists who have adequate training in the life sciences. These problems deal with important chemical interactions between species—a kind of chemical

communication and warning system—and with the metabolism and physiology of animals, plants, insects and micro-organisms. The chemistry department, therefore, has a Wood and Polymer Chemistry Option and a Biochemistry and Natural Products Chemistry Option. By selection of proper electives, students may be certified on graduation as having completed an American Chemical Society approved curriculum. Both options permit specialization in areas that are not generally available within the usual liberal arts program.

## FOREST ENGINEERING

The forest engineering curriculum is designed to serve those students interested in both forestry and engineering who look forward to challenging careers in the engineering and development aspects of forest resource management. Effective resource management is more and more dependent upon forest engineering for such projects as site construction and other physical development, transportation system planning, road and bridge construction, new buildings and service facilities, hydrologic structures, equipment engineering, modern electronic measurements and communications, data control and analysis, and systems and operations engineering. Combining civil or industrial engineering principles with essential forestry course work, this curriculum consists of a

four-year degree program at the College with a fifth year in engineeering at Syracuse University where an engineering degree is awarded. Graduate programs can also follow the four-year forest engineering curriculum.

## LANDSCAPE ARCHITECTURE

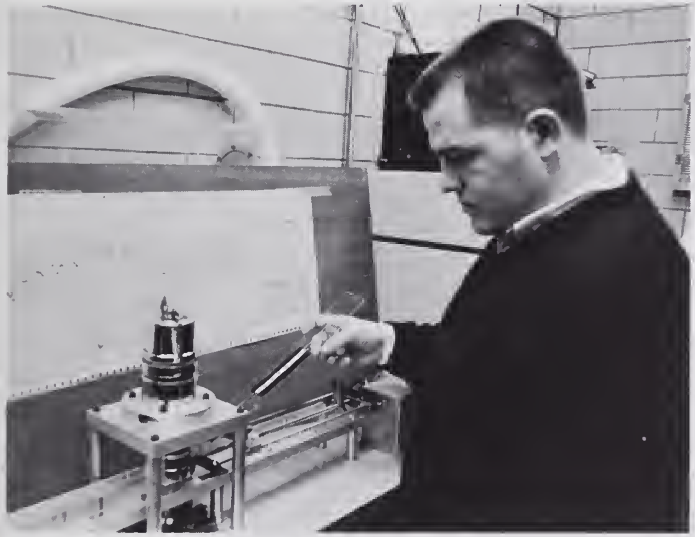
The profession of landscape architecture is expanding to meet new demands for functional and attractive outdoor environments in rural and urban areas. Site planning is a vital, integral part of recreational, industrial, commercial, public and private developments. Highway and parkway planning must answer the requirements of environmental compatibility as well as efficiency. An association with forestry is valuable for a thorough understanding of man's need to appreciate ecological relationships in his city and rural landscapes. Students must acquire a basic understanding of the multiple aspects of land resource use. The curriculum offered by the School of Landscape Architecture emphasizes design, graphics, construction, plant materials, planning and land administration.

## PAPER SCIENCE AND ENGINEERING

The pulp and paper industry is one of the major industries in our nation, and is expanding all over the world. This complex industry will require an increasing supply of highly skilled and specialized personnel, including control chemists, research chemists, production engineers, and technical service representatives. An education in paper science and engineering is related to the physical sciences, mathematics, and chemical engineering with special emphasis on their applications to the fundamental principles of pulping and papermaking. These studies involve chemistry, physics, the chemistry of pulping and bleaching, engineering principles of pulping, paper formation, drying, and finishing and the application of these sciences and principles to processing and production. Two options are offered; one a prelude to graduate study, and the other more engineering oriented.

## RESOURCES MANAGEMENT

This curriculum prepares men for professional positions as forest land managers. It provides an understanding of the principles and relationships of nature's processes, joined with an appreciation of how man's use of his resources is an integral part of his whole society and environment. Integration of the biological, engineering, technical, economic, and managerial concerns of forest land and resources use is emphasized, building upon essential understanding in general education. Resources management is recommended for students interested in professional attention to development of our land resources and natural environment, in managing lands for timber production, watershed values, wildlife and recreational uses, in forest protection, or in a wide variety of related managerial, conservation, or production activities. It is flexible enough to allow courses in several areas, including resources planning, administration, applied biology, world forestry, and conservation, and provides sound preparation for graduate study in forestry.



## WOOD PRODUCTS ENGINEERING

Technology of the wood products industries has become highly complex, providing broad opportunities for professional employment to qualified graduates. Knowledge of the structure and properties of the many commercial woods, their processing, manufacture into finished products, and new product development, as well as their distribution to the consumer, is a part of the training of a wood products engineer. Basic sciences and engineering principles are a requisite in the wood manufacturing industries, as well as the wood treatment industries.

The management of wood products industries and the marketing of wood products require the basic principles of business administration, in addition to extensive technical knowledge. Graduates of wood products engineering are in demand for industrial management and technical positions in the various product fields, such as veneer and plywood, furniture, adhesives, finishes, wood processing equipment, construction lumber, and allied industries. Three options are offered to permit flexibility in pursuing different areas within this field. Challenging careers are available in research, education, and similar technical services, both public and private. Opportunities for self-employment are numerous.

# IV

# UNDERGRADUATE STUDY

## HOW TO PREPARE FOR THE COLLEGE OF FORESTRY

Your admission to the College will be based on your academic qualifications after careful analysis of data provided by your high school or other scholastic records, standardized tests, and school recommendations. In many cases an interview will be held to assess interests and scholastic abilities.

Minimum requirements are at least 16 units as follows: English, four units; history (social studies), two units; science (at least one unit in chemistry or physics), two units; mathematics (through trigonometry), three units; and electives, five or more units. A foreign language and mechanical drawing are recommended electives.

## COLLEGE LIFE

Your freshman year will likely set the pattern of your undergraduate education. You will probably determine your standard of scholarship and the degree of participation in extracurricular activities for your college career. You will decide upon objectives and activities important to you. The management of your time for study, work or play, and the responsibility for your every action will rest with you. This is the period when you will make new friends and find your place in a new environment.

### *Orientation*

To help ease the adjustment to college life, ALL FRESHMEN AND NEW TRANSFER STUDENTS are required to attend an orientation period during registration week of the Fall semester. Here you will meet your classmates and members of the faculty and administration. You will become acquainted with the College, its functions and operation, and the various services available to you. A special orientation for foreign students is provided through the Office of International Forestry.

A weekly one-hour orientation course, General Forestry 032, is required throughout the semester for all freshmen students, including freshmen transfer students. In addition, a shorter orientation program is required for transfer students. During the early formative period in your college career, you will learn what is expected of you, and where to get help when you need it. Most of all, you will become acquainted with the general college policy which affects every student throughout his academic career.

### *Work Load*

Classes, laboratories, and study will occupy by far the greatest portion of your time at the College. Even though you anticipate working harder than ever before at college, you will find that it requires more time than you expected. The average freshman spends about 24 hours a week in class, and at least a like amount of time in out-of-class study. The usual credit hour load is 17.

Even so, you will have reasonable opportunity to participate in extracurricular activities. In these activities you will find social and recreational outlets and develop qualities of leadership, strengthen cultural and religious interests, and broaden your experience with people and organizations.

### *Extracurricular Activities*

Student Government: As a member of the student body, you will participate in the election of class officers and the Student Council. The Council is the official representative body governing extracurricular student affairs. It supervises and finances a number of student activities.

Publications: The KNOTHOLE is a news sheet published periodically during the school year. It contains both news and opinion and is produced entirely by its student staff. The EMPIRE FORESTER is the College yearbook, and has a long tradition of excellence. It is published by a student staff with a faculty advisor.

Professional and Departmental Organizations: There are several opportunities for you to join clubs that will advance your knowledge and broaden your acquaintance with students of similar interests. Following is a list of these organizations: Botany Club, Chemistry Club, Entomology Club, Forest Engineers Club, Forestry Club, Mollet Club (landscape architecture), Papyrus Club (Paper Science and Engineering), Wood Engineers' Club, Forest Zoology Club, and the student chapter of the Wildlife Society.

Other Organizations: Vox Silvae is an organization to improve the public speaking ability of students through debate. Robin Hood is the all-College Junior honorary society. Alpha Xi Sigma is the senior honorary society. Saengerbund is the College glee club. Traditions Council is an organization designed to preserve College traditions.

### *Syracuse University*

As stated previously, the College of Forestry is located adjacent to Syracuse University and a close relationship between the two institutions has been maintained through the years. Students may participate in Student Government, organizations, and other extracurricular activities at Syracuse University.

Courses: Some of the required course work in general education and basic physical sciences at the College is taken at Syracuse University. Forestry students may also take electives related to their programs of study upon receiving their advisors' approval. Courses taken at Syracuse University are covered by the tuition and fees of the College of Forestry.

LIVING ON CAMPUS: Residence in a Syracuse University living center or an approved sorority house (upperclasses only) is required of all undergraduate women, although permission may be secured from the Office of Residential Life to live with blood relatives if the parents are willing to transfer all responsibility for the student to the relative concerned.

All men are required to live in University dormitories, and the University accepts the responsibility for the housing (dormitories or fraternities) of all undergraduate men.

Syracuse University housing units are available for married students. Veterans are given preference, but there are ordinarily apartments for non-veterans.

ATHLETICS: Payment of a student athletic fee entitles students to admission to University home athletic events upon presentation of the official identification card, and the same applies to full-time graduate students.

Athletic facilities for men include Archbold Gymnasium, which houses basketball courts, handball and squash courts, a rifle range, rowing tank, and championship-size swimming pool. A ski tow and lodge on University property at Skytop are centers of much interest and recreation during the winter. There are 22 tennis courts at the University. The Manley Field House provides indoor practice facilities for many sports, including football, baseball, track, and lacrosse, and is the site of home basketball games.

Sports and dance activities for women offer the opportunity to acquire skill and understanding of these activities through the Department of Physical Education for Women.

## COLLEGE SERVICES

### *Academic and Personal Counseling*

The Office of Student Affairs is available throughout your college career as a place where you may seek, at any time, the advice of experienced counselors. This office should be your first contact when questions or personal problems arise. General advisement for foreign students is provided by the Office of International Forestry. The Registrar in the Student Affairs Office is available as needed to provide information and guidance on general academic and specific program requirements. In addition, the Coordinator of Financial Aids in the Student Services Office provides information on available scholarships, long-term state and federal educational loans, work opportunities at the College and major financial problems.

Traditionally, the College faculty has placed emphasis on academic advisement both formally and informally to meet individual student needs and considers this close faculty-student association to be a major academic strength. During registration you will be assigned to a faculty advisor to assist you as needed in your curriculum decision, program development, and elective decisions. When you select a curriculum, special advisors will be assigned to provide academic advice as needed. Faculty in your major department are available also for academic guidance. In addition, many classes are small, permitting students ample opportunity to discuss their courses and professional aspirations with instructors. While advice and counsel are available on an individual basis as needed, students at the College are encouraged early in their careers to become independent and responsible for their academic decisions as will be required in later professional life.

### *Other Counseling*

Full-time ministries are provided in all the major religious groups. They center their programs at Hendricks Chapel, except for Roman Catholics, who are served at Saint Thomas More Chapel. The Dean of Hendricks Chapel coordinates religious activities, working with eight full-time and six part-time denominational chaplains and advisors. The program of Saint Thomas More Chapel is under the direction of a chaplain.

Extracurricular activities are under the guidance of a faculty committee, the members of which meet with students during planning sessions and offer their counsel when necessary.

Resident counselors are located in all dormitories, and are available for help and assistance if needed.

As students reach the end of their undergraduate years, they often seek career guidance. Highly motivated students should consider the question of whether or not to continue their education in graduate school. At the College, this sort of counseling is handled by the departments or divisions in which you take your major work. At the completion of your college career, placement counseling is available.

### Health and Medical Facilities

Students may consult a physician for medical care or health advice at the Syracuse University Student Health Service, and are entitled to unlimited visits to the out-patient clinic and also 10 days of confinement with ordinary medical care in the Infirmary per college year. Infirmary usage over 10 days will be at prevailing Infirmary rates. The usual laboratory examinations, if necessary for treatment or diagnosis of common illness, are in the main provided without cost. Most common legal drugs are provided without extra charge.

A student accident or sickness insurance plan is available and not only supplements the usual Infirmary privileges, but is also a health protection during the summer months when students are not under care of the Health Service. Married students with dependents who are not covered by Health Service privileges are strongly urged to provide themselves and their families with special insurance made available to University students. *All foreign students are required to carry health and accident insurance.* Graduate student insurance requirements are explained in Chapter VII.

### Military Service

The Registrar's Office keeps on file up-to-date information on Selective Service. A request for draft deferment as a college student, of course, must be made by you and certified by the Registrar. Students reaching 18 years of age after arriving in Syracuse, may register with Selective Service in the Office of Student Affairs.

A Reserve Officer Training Corps program is available, however, a minimum of two years is required. Continuation of R.O.T.C. during the junior and senior years must be approved by the College and the Military Department.

### Hearing and Speech Center

The Gordon D. Hoople Hearing and Speech Center provides remedial assistance to all regularly enrolled students who may be handicapped by hearing, speech, and voice disorders. This service is without expense to students.

### Psychological Research Center

Students desiring an analysis of their aptitudes, abilities, and interests may secure special testing programs at the Research Center.

### Reading Laboratory

The School of Education, in cooperation with the College of Liberal Arts and the Psychological Research Center, maintains a reading laboratory for research in the learning skills and for training teachers and specialists in reading. Representatives from the fields of medicine, speech, and psychology cooperate in making diagnoses and in planning remediation. Large numbers of University students use this facility to improve their reading skills.

## COLLEGE REGULATIONS

The complete rules and regulations governing all students while attending the College of Forestry, and residing on the Syracuse University Campus, are included in a separate publication entitled *Undergraduate Student Handbook.* It may be obtained from the Office of Student Affairs, and is distributed to students at registration. However, it is the student's responsibility to secure a copy and

become thoroughly familiar with it. The following information does not endeavor to prescribe in detail what is either permitted or denied, but rather is confined to some of the basic academic regulations and procedures of interest to entering students.

### Course Selection

Courses are to be chosen in accordance with the regulations of an established degree program, and it is the student's responsibility to plan his program so that all degree requirements are met.

### Course Load

Normally a full-time undergraduate student will register for a course load of 15 to 18 hours.

### Late Registration

A student who fails to report for registration or fails to complete registration during the authorized period, is subject to a penalty unless excused by the Vice President for Student Affairs or his representative.

### Assignment of Grades

In each course final grades are given at the end of the semester and are expressed in letters as follows: A—excellent, B—good, C—average, D—minimum passing, F—failure, INC—incomplete, and in theses courses, S—satisfactory, U—unsatisfactory. An incomplete must be made up within one semester (time not registered as a student does not count) or an F is recorded.

### Grade-Point Average

For the purpose of determining grade-point averages, letter grades have the following values: A, 4 points for each semester hour; B, 3 points for each semester hour; C, 2 points for each semester hour; D, 1 point for each semester hour; and F, no points. Both semester and cumulative scholastic averages are computed by dividing the total grade points accumulated by the total credit hours carried. Only courses carried at the College of Forestry or Syracuse University, including Utica College and University College, are used to compute grade-point averages.

### Academic Standards

A student whose cumulative or semester average falls below 2.00 (C) will have his record reviewed by the Academic Standards Committee. If the record indicates that he might be able to meet the requirements later, he will be placed on probation. If, however, in the judgment of the Committee, he will not be able to meet the requirement, he will be academically dismissed. Freshmen will not be dropped

at the end of the first semester. They must achieve a 1.7 cumulative average or better at the end of the second semester to be eligible to continue at the College.

### *Graduation Requirements*

A student will be recommended for graduation only if he has completed the required courses prescribed for his major, and has a minimum average of 2.00. In general, this requires four years' work, either at this College or in some other College of approved standing. Residence at this College during the final year is obligatory. In some degree programs there are requirements which must be completed during one of the summer periods.

### *Academic Honors*

Students achieving a 3.0 (B) average or above for the semester are placed on the President's Honor List and a commendation is sent by the President to both students and parents.

Graduation Honors: A student is recommended for the Bachelor degree *summa cum laude* if his average for the four years is 3.83 or better; for the degree *magna cum laude* if his average is 3.34 to 3.82; and for the degree *cum laude* if his average is 3.0 to 3.33.

## COST OF ATTENDING COLLEGE

The tuition and fee structure includes library, health, infirmary, physical education, R.O.T.C., special testing and other services, as well as an assessment for student activities and charges for expendable supplies and equipment. A non-refundable fee of $5 must accompany the application for admission, but is not required of transfers from other units of State University of New York. (Graduate students refer to Chapter VII.)

### *Residents of New York State*

Total tuition and fees of $565.00 to be paid as follows:

| | |
|---|---|
| Advance Payment* | $ 50.00 |
| Due at September registration | 232.50 |
| Due at February registration | 282.50 |
| Total | $565.00 |

### *Non-Residents of New York State*

Total tuition and fees of $915.00 to be paid as follows:

| | |
|---|---|
| Advance Payment* | $ 50.00 |
| Due at September registration | 407.50 |
| Due at February registration | 457.50 |
| Total | $915.00 |

*Advance Payment of $50 is due within 30 days from the date of acceptance. It is refundable up to May 1.

### *Other Costs*

Assessment for the Student Loan Fund and Alumni Association membership of $1 is required for sophomores each semester, and all new transfer students in their first year. A commencement fee of $10 is required at the beginning of the semester in which the degree is expected.

Housing costs at Syracuse University range from $470 to $720 for 34 weeks depending upon the size of the room. Most rooms are for two students and are furnished with beds, mattresses, pillows, desks, chairs, study lamps, and dressers. A commercial linen service operates on campus and is available for those who order it.

Board Costs at Syracuse University are $700 for 34 weeks, 20 meals weekly (none Sunday night). Housing and board rates are subject to change and inquiries about them should be sent to: Office of Residential Life, Syracuse University, Syracuse, New York 13210.

Other expenses, including books and supplies, average about $75 for the fall semester and $75 for the spring semester. Certain curriculums require a summer session in field forestry following the sophomore year, which lasts for 5 weeks and costs approximately $150. Extended field trips, lasting up to three weeks, are required in landscape architecture, and wood products engineering, and these range in cost from $100 to $200.

### Terms of Payment

A check or money order for tuition and fees should be made payable to "State University College of Forestry," and payment is made at the Business Office of the College. The advance payment should be mailed to the Business Office, College of Forestry, Syracuse, New York 13210.

*Payment for housing and board is made directly to Syracuse University.*

### Refunds

The following policies shall apply to tuition liability and refunds for students cancelling their registration.

A student who is given permission to cancel his registration shall be liable for payment of tuition in accordance with the following schedule:

| *Liability During* | *Semester* |
|---|---|
| 1st week | 0 |
| 2nd week | 30% |
| 3rd week | 50% |
| 4th week | 70% |
| 5th week | 100% |

No money shall be refunded unless application for refund is made within one year after the end of term for which the tuition requested to be refunded was paid to State University. The first day of class session shall be considered the first day of the semester and Saturday of the week in which this first class session occurs shall be deemed the end of the first week for refund purposes. It is interpreted that a student who does not attend any class sessions after Saturday of the first week and who notifies the College of his intent to cancel registration on or before the second Saturday following the first day of classes shall be deemed to have cancelled his registration during the first week.

There shall be no tuition or fee liability established for a student who withdraws to enter military service prior to the end of an academic term for those courses in which he does not receive academic credit.

A student who is dismissed for academic or disciplinary reasons prior to the end of an academic term shall be liable for all tuition and fees due for that term.

A student who cancels his registration at a unit of the State University and within the same term registers at another unit of the State University, shall be entitled to full credit for tuition and fees paid for that term.

Notwithstanding any other provisions for refund, when a student has withdrawn through circumstances beyond his control, under conditions in which the denial of refund would cause undue hardship, the Chief Administrative Officer of the unit, may, in his discretion, determine that no liability for tuition has been incurred by the student, provided the student has not completed more than one half of the term and has not received or will not receive academic credit for the term. Such action, including the reason therefore, shall be in writing.

## FINANCIAL AID

It is easier today than ever before to finance a college education. Various types of scholarships, government aid, and loans are available at the College of Forestry for students who need financial assistance. Scholarships and loans are often obtained from sources in the students' home communities, such as companies, fraternal organizations, service clubs, churches, alumni groups and the like.

Complete information on financial assistance may be obtained from the Coordinator of Financial Aids at the College, either directly or by mail. Some of the various types of aid, however, are listed below:

For New York State residents, the Scholar Incentive Program, Regents Scholarships, and State University Scholarships offer possible financial aid. The New York Higher Education Assistance Corporation offers loans to residents which are interest free until 9 months after college, and then draw 7 per cent annual interest. Repayment of a loan cannot be scheduled for more than a 10-year period.

Any undergraduate student in good standing and who needs financial assistance may borrow up to $1,000 per year (graduate student $2,500) under the Student Loan Program of the National Defense Education Act of 1958. No interest will accrue until 9 months after college, and part of the loan will be cancelled if the student becomes a public elementary or secondary school teacher or college teacher. A 10-year repayment period is allowed.

The College is a recipient of funds from the Higher Education Act of 1965. These funds enable the College to award Educational Opportunity Grants to students who have exceptional financial need. These grants range from $200 to $1,000 per year.

The College of Forestry Alumni Association offers a variety of assistance. Memorial Awards are made to outstanding students, interest-free loans are available to meet emergency expenses, and several educational grants ranging from $100 to $500 each are made each year.

A limited number of tuition waivers are available for award to qualified foreign students.

Special financial assistance includes the following: Charles Lathrop Pack Awards, Charles Malcomb Harlow Memorial Loan Fund, Friedrich U. Klaehn Memorial Scholarship in Silviculture, David B. Schorer Memorial Fund, Edward

Vail Emergency Fund, C. Ives Gehring Memorial Fund, James D. Judson Memorial Fund, Portia Farrell Morgan Scholarship, Jack L. Krall Memorial Scholarship Fund, Boston Paper Trade Association Scholarship, Phyllis Roskin Memorial Award, State University at Syracuse Chapter of CSEA Scholarship, and the Student Association Grants.

Other opportunities include: Allied Paper Salesmen's Association Award, Harold L. Austin Memorial Scholarship, Boxboard Research and Development Scholarship, Nelson Courtlandt Brown Scholarship Fund, Henry H. Buckley Student Aid Awards, Geigy Dyestuff's Scholarship, C. E. Libby Award, Milton Conservation Club Award, Frank B. Myers Memorial Award, New York-Canadian Division of Paper Industry Management Association Scholarship, Pen-Jer-Del Division of the Paper Industry Management Association Scholarship, Plastics Engineer's Award, St. Regis Paper Company Scholarship, and Syracuse Pulp and Paper Foundation Scholarships.

In addition, work grants are available to pre-freshmen; there are part-time work opportunities at the College, and the Economic Opportunity Act of 1964 offers a work-study program.

## HOW TO APPLY FOR ADMISSION

### *Entering Freshmen*

To apply for admission if you are a resident of New York, you should request the proper forms from your local high school guidance office; for nonresidents you should request them directly from the College's Office of Admissions. *However, in either case you must obtain directly from the Office of Admissions additional supplemental forms other than what you may obtain from your guidance counselor.*

Allow about three to four weeks for delivery of this material. Revised admissions forms are available beginning September of one year for entry the following year.

The target date for final decision on most applications for September entry is May 1. Freshman applicants will begin to receive notification of the admissions decisions after February 15. Freshmen are not generally admitted to the College in February. A copy of the decision letter on an application is sent to the applicant's high school guidance office. (Graduate students refer to Chapter VII)

### *Transfer Students*

Students with previous college experience, or who are currently enrolled at another college may apply for transfer. Transfer applications are considered for February as well as September. However, February transfer will depend upon the availability of courses appropriate to the curriculum selected.

It is College policy that any student who is academically dismissed must wait at least one semester before applying to this college.

Students with two years of college can generally arrange their programs to allow transfer to the College of Forestry with a junior standing. Courses transferred for credit must be appropriate to the student's curriculum choice and successfully completed with a passing grade (D or better)*. In addition, courses to be transferred as required courses in a curriculum must be comparable in content. Course credit hours are transferred, but grades and grade points are not transferrable.

In applying to the College for transfer, it is your responsibility to submit a recent official transcript from the college you are currently attending, and similar documents from all colleges previously attended. Also, a catalog from each college may be required.

### *International Students*

The College accepts international students on the undergraduate level if they can satisfy all regular admissions requirements. It is recommended, however, that students from foreign countries obtain their baccalaureate degree in their home country if at all possible and apply to the College as a graduate student. Experience has shown that this arrangement provides for greater academic achievement and more efficient use of the student's time and funds. If an international student wishes to apply as an undergraduate, he must meet the secondary school requirements for entrance; show that he is proficient in the English language through acceptable results of the TOEFL test and/or College Entrance Examination Board Achievement Test in English; provide competitive scores on the C.E.E.B.'s Scholastic Aptitude Test in the verbal and math areas; and produce evidence that he can meet all financial obligations.

Undergraduate foreign students must file official State University of New York admissions forms. These may be obtained by writing to the Director of Admissions at the College. No fee is required for processing the application. If the foreign student is accepted, he must obtain adequate health and accident insurance before he will be allowed to register at the College.

International students who are currently enrolled at an American college may apply for transfer to the College. They must meet all regular entrance requirements plus those of a Transfer Student as listed on page 38. Permission to transfer must be obtained from the U.S. Immigration and Naturalization Service district office having jurisdiction over the college in which the student is currently enrolled.

### *Admission Examination*

State University of New York requires resident applicants to take the N.Y. Regents Scholarship Examination (administered only in early October in most high schools in New York) if the applicant is residing or attending school in the State during the year prior to entrance to college. If an applicant does not take this test, he must submit the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board (CEEB) or the American College Test (ACT). The College Director of Admissions may waive the requirement for, (1) applicants from outside New York State, who must substitute scores earned in the Scholastic Aptitude Test of the College Entrance Examination Board, or the American College Test, (2) late applicants, and (3) applicants for admission as transfers from another college.

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*Note: Students who transfer courses in which a grade of "D" has been earned must be sensitive to possible deficiencies when that material is used in upper division classes.

### Health Examination Report

Each new student is required to submit a history and physical examination report on a form that will be sent after the initial acceptance notice. *It is to be completed and returned within two weeks to the Admissions Office, State University College of Forestry, Syracuse, New York 13210.*

### Entrance With Advanced Standing

Secondary school students may earn credit toward the B.S. or B.L.A. degree before enrolling as freshmen at the College. This enables students to carry higher course loads, and may be accomplished in two ways:

1. Evening and Saturday courses in mathematics or English, for instance, given by a nearby college may be open to recommended high school seniors. After successful completion, an official transcript or other appropriate document should be sent to the College by the institution along with a catalog description of the course or courses.

2. College-level courses given by high schools in the Advanced Placement Program of the College Entrance Examination Board to recognize and develop academic talent. Such courses as biology, mathematics, chemistry, English, and foreign languages offer opportunity for degree credit at this College. The determination of credit is made by faculty members to whom the student's final examination papers are sent after they have been graded.

### College Proficiency Examinations

The New York State College Proficiency Examination Program is a means by which students may receive college credit for specific courses by examinations, without being in residence for a course or taking structured correspondence lessons. The College also accepts the College Level Examination Program (CLEP) of the College Entrance Examination Board. These examinations are open to all who make application.

The College approves of the CPE and CLEP programs in general and will evaluate the performance of participants. Satisfactory performance by a student must be demonstrated during at least one semester in residence at this College

before granting credit. This residence may be prior or subsequent to the examination.

If all College policy requirements are met, grades A and B will receive credit; credit for a grade of C will be granted only upon recommendation of the department of the applicant's major; and no credit will be granted for a grade lower than C.

Application for credit should be made to the Office of Student Affairs. Application for deviation from the prescribed policy may be made to the Academic Standards Committee for undergraduate credit and the Committee on Graduate Studies for graduate credit.

# V

# UNDERGRADUATE PROGRAMS

## ENTERING FRESHMEN

The seven curriculums described in Chapter III lead to a Bachelor of Science degree, and the five-year Landscape Architecture curriculum leads to a Bachelor of Landscape Architecture degree.

Entering freshmen will review the demands and opportunities of the curriculums with an assigned advisor during the registration period, in order to select the first-semester elective. Before the end of the first semester, however, each freshman must make his curriculum choice. In reaching this decision he will be assisted as needed by faculty advisors, the Office of Student Affairs, by conversations with upperclassmen, and by first-hand acquaintance with the College's programs, facilities, and personnel.

### FRESHMAN YEAR — FIRST SEMESTER — ALL CURRICULUMS

| | | *Credit Hours* |
|---|---|---|
| F. Botany 100 | General Botany | 4 |
| English | Freshman English | 3 |
| Mathematics | | 3 |
| *Chemistry 106 | General Chemistry | 4 |
| *Elective | | 3 |
| Orientation | | 0 |
| Phys. Educ. or ROTC | | 0 |
| | | 17 |

Students interested in meeting the education requirements for initial professional forestry positions in federal and state resource managing agencies are able to qualify fully by successful completion of either the Resources Management curriculum or the Forest Engineering curriculum. They may also do so in the Forest Biology curriculum through selection of appropriate forestry courses as electives, under guidance of a faculty advisor.

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*Students who definitely know they are going to pursue the Environmental Studies and Landscape Architecture Curriculums will substitute Philosophy 105, 3 credit hours, for Chemistry, 4 credit hours, and will take Graphics 182: Art Media I, 1 credit hour, as their elective, for a total semester load of 14 credit hours.

## TRANSFER STUDENTS

The College of Forestry has designed its undergraduate curriculums to accommodate entering transfers from two-year and other colleges. Students taking recommended course series or Associate degree programs containing specified courses generally may register at the entering junior level without credit loss. The various course or program requirements for effective transfer are listed in each curriculum description in the following section. A transfer student will be held responsible for the total credit hour requirement of the curriculum into which he enrolls, including special summer sessions, field trips and/or summer employment as required in that major.

The Admissions Office will be pleased to answer questions concerning transferring, and to evaluate records and advise on courses where there are questions. Students applying for transfer will generally follow the admissions procedures described on page 32.

## DUAL ENROLLMENT WITH TWO YEAR COLLEGES

The College of Forestry has completed an arrangement for a dual enrollment program with Columbia-Greene Community College for those students who wish to transfer to the College. Any applicant for the Liberal Arts, Math and Science program with a Forest Management concentration at the two-year college is evaluated by both institutions. Upon acceptance and successful completion of the Associate in Science degree, the student is automatically accepted to the College of Forestry. Dual enrollment programs are to be expanded to other two-year colleges in the near future.

## FOREST BIOLOGY

The Forest Biology Curriculum is designed to educate biologists, and to provide them an orientation to forestry principles. This program was developed for those students planning graduate study in the biological sciences as well as those seeking positions as forest biologists in forestry, such as forestry research, disease and insect control, recreation, fish and wildlife biology, or conservation. The effective management and protection of forests and related natural resources are becoming increasingly dependent on the research contributions and professional guidance of biologists for solutions of a wide range of natural resource problems.

The curriculum is built around a core of required courses which provides a sound background in biology and the physical sciences, an introduction to forestry principles, and a general education. It is designed to achieve breadth in biology as well as depth in a selected concentration area. The Forest Biology Curriculum is flexible and a variety of programs may be developed within or across the various participating departments to meet the academic goals and special subject interests of the student. Each student is assigned an advisor to aid in program decisions.

All students are considered to be majoring in *biology*.

General requirements for federal state biology positions are met. Position requirements in a broad range of special biological fields related to natural resources also may be achieved by selection of electives. Requirements for federal and state forestry positions may be satisfied by choosing specified forestry subjects as electives.

The curriculum has been arranged to facilitate transfer of students from the State University Community Colleges at the end of their freshman or sophomore years. Recommended core courses for students planning to transfer as entering juniors total 64 credits or an Associate degree and include:

| | |
|---|---|
| Biology | 8 credits |
| General Chemistry | 8 credits |
| Organic Chemistry | 8 credits |
| Physics | 8 credits |
| Mathematics through Integral Calculus | 8 credits |
| Economics | 3 credits |
| English | 6 credits |
| *Electives | 14 credits |

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*To include 3 courses totalling 9 credits in the humanities and social sciences.

Attendance at a 5-week Summer Session course in Field Forestry at the Pack Demonstration Forest, Warrensburg, N.Y., is required. In special cases, attendance at the Cranberry Lake Biological Station or its equivalent may be substituted (see note 2 below).

In addition to the courses specified in the program, students must meet the following requirements:

1) Twelve credits in a selected biology concentration (zoology or wildlife biology, botany, forest entomology, silvics).

2) Six credits in a second biological area.

3) The courses selected in the concentration subjects should include at least one from each of three of the following broad areas of biology: physiology, classification, structure-development, and ecology.

4) Three credits in the resources management area.

5) Nine credits in the humanities and social sciences selected with the approval of the faculty advisor.

6) Twenty-seven credits in elective courses selected with the approval of the faculty advisor.

### *Electives*

1. Students planning graduate study are urged to take two semesters of a language (as approved by their faculty advisor) as a part of their humanistic-social sciences electives requirement.
2. Students planning to meet special requirements for biology specialty positions in federal and state service should review the available Civil Service publications and become familiar with the specific course requirements to be met by elective substitution with the approval of the faculty advisor.
3. Students planning to meet special requirements for federal Civil Service positions in forestry at the GS-5 and GS-7 levels may do so by electing 10 credits in additional forestry courses and attending the Summer Session in Field Forestry at Warrensburg, N.Y. These special forestry requirements may be fulfilled by courses selected with the approval of the faculty advisor.

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1. *Mathematics through integral calculus (Math 227 or the equivalent) is required.
2. **Students with a 2.5 academic average or better may substitute for this requirement 6 credit hours of courses at the Cranberry Lake Biological Station or other biological field stations. The courses selected must have the approval of the student's advisor. A minimum of 6 credit hours is required and it is preferable that the summer program be taken between the Junior and Senior years.
3. Five credits of additional forestry courses are recommended for those students not attending the Summer Session in Field Forestry.
4. A total of 131 credit hours is required in this curriculum.

## FOREST BIOLOGY CURRICULUM

### Freshman Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 | | | |
| | | 17 | | | 17 |

### Sophomore Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| F Biol 320 | General Ecology | 3 | F Econ 300 | Intro to Macro Economics | 3 |
| Electives | | 6 | Electives | | 6 |
| | | 17 | | | 17 |

Summer Session Alternate A**

SUMMER SESSION IN FIELD FORESTRY

5 weeks—6 credit hours. This program is conducted in two separate sessions during the summer period at the College's Pack Demonstration Forest near Warrensburg, N.Y.

**See Note 2 below.

| | | |
|---|---|---|
| F Biol 301 | Field Biology | 1 |
| Silvi 302 | Silvics | 1 |
| F Mgt 303 | Introduction to Forest Measurements | 1 |
| Res Mgt 304 | Silviculture—Resources Management | 3 |
| | | 6 |

### Junior Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| F Bot 210 | Dendrology I | 2 | A M 571 or A M 591 | Introduction to Statistical Analysis ...(3)<br>Introduction to Probability and Statistics ...(3) | 3 |
| F Ento 500 | Elements of Forest Entomology | 3 | Geol 105 or Silvi 332 | Introductory Geology ...(3)<br>Soils ...(3) | 3 |
| F Biol 330 | Principles of General Physiology | 3 | Electives | | 6 |
| Electives | | 6 | | | |
| | | 14 | | | 12 |

Summer Session Alternate B**

SUMMER SESSION IN ENVIRONMENTAL BIOLOGY

8 weeks, 6–8 credits. Courses selected require approval of the student's advisor. Program conducted in July–August at the Cranberry Lake Biological Station, Pack Experimental Forest, Cranberry Lake.

Summer Session Alternate C**

Attendance at other approved biological field stations may be arranged. The courses selected must have the prior approval of the student's advisor.

### Senior Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| F Biol 571 | Fundamentals of Genetics | 3 | Electives | | 15 |
| F Biol 572 | Fundamentals of Genetics Lab | 1 | | | |
| Electives | | 12 | | | |
| | | 16 | | | 15 |

## FOREST CHEMISTRY

By selecting proper electives, students in either of the two following options may be certified on graduation as having completed an American Chemical Society approved curriculum. Both options are excellent grounding for professional work at the B.S. level or for advanced graduate study.

Recommended core courses for students planning to transfer as entering juniors total 64 credits or an Associate degree and include:

| | |
|---|---|
| Biology | 8 credits |
| General Chemistry | 8 credits |
| Organic Chemistry | 8 credits |
| Physics | 8 credits |
| Mathematics through Integral Calculus | 8 credits |
| Economics | 3 credits |
| English | 6 credits |
| Electives | 14 credits |

### *Biochemistry and Natural Products Option*

This option is designed for students who wish to approach problems in the life sciences with the tools and point of view of the chemist. In addition to a major concentration in the several branches of chemistry, the student obtains a solid grounding in the fundamentals of physics, mathematics, and biology. Professional electives can provide a minor concentration in botany, ecology, entomology, zoology or physiology. Collaborative efforts of chemists and biologists are providing new solutions to problems of environment, natural resources and health.

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1. *One course of mathematics or applied mathematics beyond Math 227 or Math 397, or equivalent, is required.
2. **A sequence of professional electives should be chosen in the junior year. In addition to the freshman biology courses. a student whose emphasis is in biochemistry must take 3 semester hours of genetics and at least another 3 semester hour biology course. A student whose emphasis is in natural products must take 3 semester hours of biology in addition to the freshman biology courses and an additional hour of organic chemistry laboratory (FC 496) and a second hour of FC 584.
3. ***Polymer Properties, FC 556 (3 credit hours) is suggested.
4. ****Petition by student to Dept. for replacement of this requirement will be considered to allow time for special interest.
5. *****G F 502 may be substituted.
6. A total of 130 credit hours is required.

# FOREST CHEMISTRY CURRICULUM
## BIOCHEMISTRY AND NATURAL PRODUCTS CHEMISTRY OPTION

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| **Freshman Year** | | | | | |
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| GF 032 | Orientation | 0 | | | |
| | | 17 | | | 17 |
| **Sophomore Year** | | | | | |
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| Phys 105 | General Physics for Science Students I | 4 | Phys 106 | General Physics for Science Students II | 4 |
| Elective | | 3 | F Econ 290 | Introduction to Economics for Forestry | 3 |
| | | 16 | | | 16 |
| **Junior Year** | | | | | |
| F Chem 325 | Organic Chemistry III | 3 | *Math or Elective | | 3 |
| Chem 332 | Quantitative Analysis | 2 | F Chem 584 | Spectrometric Identification of Organic Compounds | 1 |
| Chem 333 | Quantitative Analysis Lab | 1 | Chem 434 | Instrumental Analysis | 2 |
| Chem 346 | Physical Chemistry | 3 | Chem 435 | Instrumental Analysis Lab | 1 |
| **Professional Elective | | 2–4 | Chem 356 | Physical Chemistry | 3 |
| Elective | | 3 | Chem 357 | Physical Chemistry Lab | 1 |
| | | | **Professional Elective | | 2–3 |
| | | | Elective | | 3 |
| | | 14–16 | | | 16–17 |
| **Senior Year** | | | | | |
| F Chem 495 | Introduction to Professional Chemistry | 2 | ****F Chem 498 | Introduction to Research | 5 |
| F Chem 575 | Wood Chemistry I | 2 | F Chem 497 | Undergraduate Seminar | 1 |
| F Chem 578 | Wood Chemistry Lab | 1 | F Chem 532 | Biochemistry II | 3 |
| F Chem 530 | Biochemistry I | 3 | F Chem 577 | Wood Chemistry III | 2 |
| F Chem 531 | Biochemistry Lab | 2 | *****Pub Add 215 | Public Speaking | 3 |
| ***Electives | | 6 | Elective | | 3 |
| | | 16 | | | 17 |

### Wood and Polymer Chemistry Option

This option is designed for students interested in the structure and physical properties of man-made and natural materials, the giant molecules of wood, plastics, polysaccharides, proteins, rubbers and fibers. The recently discovered chemistry of these materials constitutes one-half the concern of chemical industry and is the origin of a major revolution in our way of life and our understanding of nature. This special subject area is an advanced core of studies beyond the basic courses of the classical undergraduate chemistry curriculum.

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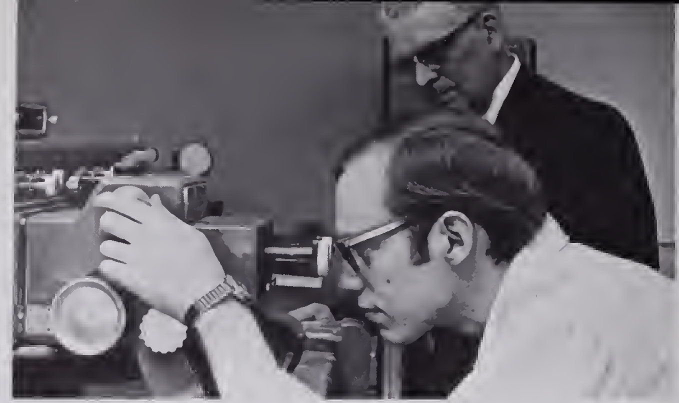
1. *One course of mathematics or applied mathematics beyond Math 227 or Math 397, or equivalent, is required.
2. **A sequence of two or more professional electives in related disciplines with a minimum of 5 credits should be chosen in the fall of the Junior Year from the College of Forestry offerings. Wood Products Engineering and Paper Science and Engineering courses are recommended.
3. ***Biochem I, FC 530 (3 credit hours) suggested.
4. ****Petition by student to Dept. for replacement of this requirement will be considered to allow time for special interest.
5. *****G F 502 may be substituted.
6. A total of 130 credit hours is required.

## FOREST CHEMISTRY CURRICULUM
## WOOD & POLYMER CHEMISTRY OPTION

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| **Freshman Year** | | | | | |
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| GF 032 | Orientation | 0 | | | |
| | | 17 | | | 17 |
| **Sophomore Year** | | | | | |
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| Phys 105 | General Physics for Science Students I | 4 | Phys 106 | General Physics for Science Students II | 4 |
| Elective | | 3 | F Econ 290 | Introduction to Economics for Forestry | 3 |
| | | 16 | | | 16 |
| **Junior Year** | | | | | |
| F Chem 325 | Organic Chemistry III | 3 | *Math or Elective | | 3 |
| Chem 332 | Quantitative Analysis | 2 | F Chem 584 | Spectrometric Identification of Organic Compounds | 1 |
| Chem 333 | Quantitative Analysis Lab | 1 | Chem 434 | Instrumental Analysis | 2 |
| Chem 346 | Physical Chemistry | 3 | Chem 435 | Instrumental Analysis Lab | 1 |
| **Professional Elective | | 2–4 | Chem 356 | Physical Chemistry | 3 |
| Elective | | 3 | Chem 357 | Physical Chemistry Lab | 1 |
| | | | **Professional Elective | | 2–3 |
| | | | Elective | | 3 |
| | | 14–16 | | | 16–17 |
| **Senior Year** | | | | | |
| F Chem 495 | Introduction to Professional Chemistry | 2 | ****F Chem 498 | Introduction to Research | 5 |
| F Chem 550 | Introduction to Polymer Chemistry I | 3 | F Chem 552 | Introduction to Polymer Chemistry II | 3 |
| F Chem 551 | Polymer Techniques | 2 | F Chem 577 | Wood Chemistry III | 2 |
| F Chem 575 | Wood Chemistry I | 2 | F Chem 497 | Undergraduate Seminar | 1 |
| F Chem 578 | Wood Chemistry Lab | 1 | *****Pub Add 215 | Public Speaking | 3 |
| ***Electives | | 6 | Elective | | 3 |
| | | 16 | | | 17 |



## FOREST ENGINEERING

The primary objective of this curriculum is to prepare qualified graduates who will operate with professional engineering competence within the context of forestry and natural resources development. It is an engineering curriculum, fundamentally interwoven with essential principles of forestry to develop environmental understanding and ecological awareness.

The curriculum consists of a four-year program at the College of Forestry preparatory to a fifth year in either civil, industrial or mechanical engineering at Syracuse University. The Bachelor of Science degree will be awarded by the College upon completion of the four-year program; a Bachelor of Science degree in Engineering will be awarded by Syracuse University upon completion of requirements in a fifth year. Graduate programs at the College, building upon the four-year Forest Engineering Curriculum, are also possible during the fifth year.

Minimum professional requirements, both in Forestry and Engineering, are met by the core of required courses, and these are strengthened in areas suited to the student's goals through proper advisory use of the electives that may be taken throughout the program.

Graduates with Associate degrees in engineering science or science and mathematics usually find transfer acceptance as entering juniors. Students looking forward to career opportunities in Forest Engineering are urged to obtain guidance on specific requirements from the Admissions Office of the College of Forestry as early as possible in their preparatory programs.

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1. Three credit hours must be elected in an upper division forestry course outside of the School of Environmental and Resource Engineering.
2. Twelve credit hours must be elected in social sciences or humanities.
3. *Mathematics through Differential Equations is required.
4. **Electrical Engineering, thermodynamics, or advanced engineering materials. Each beyond freshman physics or the equivalent of CIE 325.
5. ***An advisor approved engineering design or synthesis course may be substituted. To be approved, the course must fit the objectives of professional forest engineering. Advanced courses in production or operational systems are suitable examples.
6. ****An advisor approved photogrammetry course may be substituted for F Engr 503.
7. A total of 136 credit hours is required for the B.S. degree from the College of Forestry in this curriculum.

## FOREST ENGINEERING CURRICULUM

### Freshman Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| GF 032 | Orientation | 0 | | | |
| | | 17 | | | 17 |

### Sophomore Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| Gr 280 | Technical Drawing | 3 | A M 360 | Introduction to Computer Programming | 3 |
| F Econ 301 | Introduction to Micro-Economics | 3 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| MEE 225 | Engineering Mechanics | 4 | MEE 226 | Engineering Mechanics | 3 |
| Elective | | 3 | | | |
| | | 18 | | | 16 |

### Junior Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| F Engr 310 | Forest Engineering Problems | 3 | F Engr 301 | Plane and Geodetic Surveying | 3 |
| F Bot 210 | Dendrology I | 2 | F Engr 340 | Hydrology | 3 |
| A M 591 | Introduction to Probability and Statistics | 3 | F Engr 563 | Photogrammetry | 3 |
| Math 585 | Higher Mathematics for Engineers and Scientists I | 3 | Silvi 324 | General Silviculture | 3 |
| CIE 327 | Principles of Fluid Mechanics | 4 | CIE 325 | Mechanics of Deformable Bodies | 3 |
| **Engineering Science Elective | | 3 | Elective | | 3 |
| | | 18 | | | 18 |

### Senior Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| F Engr 410 | Structures | 4 | F Engr 510 | Transportation Systems | 3 |
| F Engr 412 | Principles of Production (Harvesting) | 3 | ***F Engr 540 | Hydrologic Controls | 3 |
| F Mgt 530 | Forest Management | 4 | F Engr 599 | Forest Engineering Planning | 4 |
| CIE 437 | Soil Mechanics and Foundations I | 3 | Electives | | 6 |
| Elective | | 2–3 | | | |
| | | 16–17 | | | 16 |

### Optional Senior Year—Photogrammetry & Geodetic Engineering Emphasis

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| F Engr 502 | Terrestrial Geodesy | 3 | F Engr 566 | Remote Sensor Interpretation | 3 |
| F Engr 560 | Theory of Errors and Adjustments | 3 | F Engr 599 | Forest Engineering Planning | 4 |
| F Engr 564 | Photogrammetry II | 3 | ****F Engr 503 | Astro-Geodesy | 3 |
| A M 560 | Information Processing Fundamentals | 3 | Electives | | 6 |
| F Mgt 530 | Forest Management | 4 | | | |
| | | 16 | | | 16 |

## LANDSCAPE ARCHITECTURE

Professional education in the design professions today is witness to a great deal of concern for school objectives, programs, and organization. The central issue relates to the force and pace of change that characterizes the work of the environment designer and brings him into ever new challenging situations. The condition of our cities, depletion of natural resources, and pollution of our air and water all pose severe and complex threats to our society. Concurrently, a greater awareness and desire for environmental quality tax the resources and ingenuity of those in the design professions.

Several trends have emerged in recent years that suggest conditions for present and future educational programs. It is clear that an interdisciplinary approach to environmental problems is indicated and includes landscape architecture, architecture, engineering and planning, with specific attention to the biological and behavioral sciences. It is also clear that the educational purpose must relate more directly to the health and well-being of man and be designed for versatility rather than the narrow concerns of career orientation. Finally, that contemporary education should orient the student to systems thinking in his approach to knowledge, society, and the individual.

In an effort to recognize and respond to the demands and responsibilities of our times, the following curriculum is offered in environmental studies and landscape architecture. The major characteristics of the program are:

1. An expansive frame of reference for landscape architects as major contributors to the solution to environmental problems, with a concurrent broad educational base for their professional training.
2. Provision for flexibility to accommodate shifts in educational goals, particularly within the design professions.
3. Articulation with the programs of the two-year colleges to permit ready transfer to professional programs.
4. Professional training to more adequately meet the educational standards of accrediting bodies, the American Society of Landscape Architects and the Division of Professional Education of the New York State Education Department.

The curriculum is based on three consecutive educational sequences:

1. The first two years may be taken at this college or at any other school or college. Students may transfer into the freshman, sophomore, or junior programs, depending upon acceptable transfer credit.

   Requirements for students planning to transfer as entering juniors are as follows: (a) Associate degree or acceptable transfer credit totalling a minimum of 60 semester credit hours or their equivalent; (b) biology, 3 credits, and technical drawing, 3 credits; and (c) the equivalent of college algebra and trigonometry plus high school chemistry or physics.

A recommended course series prior to transfer would include:

| | |
|---|---|
| English (Composition) | 4 credits |
| English (Literature) | 6 credits |
| Speech | 3 credits |
| Biological Sciences | 6 credits |
| Social Sciences | 9 credits |
| Art Media | 2 credits |
| Geology | 3 credits |
| Geography | 3 credits |
| Humanities | 6 credits |
| Technical Drawing | 3 credits |
| Surveying | 3 credits |

This series is strongly recommended but not required. Deficiencies in these areas will be accommodated as possible during subsequent semesters and summer school sessions.

2. The third and fourth years are devoted to a broad spectrum of courses dealing with a variety of aspects of environment and man's relationship to it, synthesized through development of ability in both the functional and creative design processes. In order to provide as great an exposure as possible to the interrelationship of culture and environment, the final semester of the fourth year is conducted at a university in a foreign location, where course work is taught by members of the staff of the School of Landscape Architecture and by staff of the host school. The exact site of this foreign study program will vary at 2- to 3-year intervals as the location is shifted to maximize faculty and student contact with a variety of cultural-environmental situations and conditions.

   The successful completion of this 127-hour program qualifies the student to receive a Bachelor of Science degree with a major in Environmental Studies. The education has been broad but with sufficient training to focus the student's concerns for the physical environment and its significance. At this point, students may enter the field for a trial experience in professional practice, may pursue graduate study in a different discipline, or may apply to continue study toward a professional landscape architectural degree.

3. The fifth year is devoted to a concentration of professional courses aimed at preparing graduates for the profession of landscape architecture. Successful completion of this 33-hour program leads to the degree of Bachelor of Landscape Architecture, the first professional degree. Study beyond this point is accommodated by our Master of Landscape Architecture program.

## LANDSCAPE ARCHITECTURE CURRICULUM

### First Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | F Zool 100 | General Zoology | 4 |
| F Bot 100 | General Botany | 4 | E I 113 | Intro. to Environmental Studies | 3 |
| Phil 105 | Problems of Knowledge | 3 | F Econ 290 | Intro to Economics for Forestry | 3 |
| Gr 182 | Art Media I | 1 | Gr 183 | Art Media II | 1 |
| Phys Ed or ROTC | | 0 | *Elective | | 3 |
| GF 032 | Orientation | 0 | Phys Ed or ROTC | | 0 |
| | | 14 | | | 17 |

### Second Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| **English | | 2–3 | **English | | 2–3 |
| F Bot 210 | Dendrology I | 2 | Phil 351 | Concepts in Logic | 3 |
| F Mgt 201 | Plane Surveying | 3 | Gr 281 | Landscape Architectural Drafting | 3 |
| Gr 284 | Art Media III | 1 | E I 211 | General Geography | 3 |
| Psych 205 | Foundations of Human Behavior | 3 | Soc 201 | Introductory Sociology | 3 |
| *Elective | | 3 | Gr 285 | Art Media IV | 1 |
| | | 14–15 | | | 15–16 |

### Third Year

| First Semester | | Credit Hours | Second Semester | | Credit Hours |
|---|---|---|---|---|---|
| LA 322 | Basic Design | 2 | LA 325 | Landscape Design Studio I | 2 |
| LA 324 | Intro. to Landscape Architecture | 3 | LA 343 | Structural Materials and Elements | 3 |
| Gr 382 | Graphics | 2 | LA 345 | Elements of Site Engr. | 3 |
| F Biol 320 | General Ecology | 3 | Gr 383 | Graphics | 2 |
| ***Elective | | 2–3 | AM 360 | Intro. to Computer Programming | 3 |
| ***Elective | | 3 | EI 311 | Principles of Land Use | 3 |
| | | 15–16 | | | 16 |

Summer Session

LA 333: Plant Materials. Three-week course in Plant Materials, 3 credit hours, conducted at Farmingdale, New York.

## Fourth Year

(Refer, also, to notes below)

| | | |
|---|---|---|
| LA 420 | Landscape Design Theory I | 2 |
| LA 422 | Landscape Design Studio II | 4 |
| LA 430 | Plant Materials Culture | 3 |
| LA 440 | Site Development Systems | 3 |
| E I 470 | Art History | 3 |
| ****Elective | | 3 |
| | | 18 |

FOREIGN LOCATION

| | | |
|---|---|---|
| LA 421 | Landscape Design Theory II | 2 |
| LA 423 | Landscape Design Studio III | 4 |
| LA 463 | Architecture I | 3 |
| E I 411 | Socio-Cultural Impacts on Environmental Design | 3 |
| E I 471 | History of Landscape Architecture | 3 |
| | | 15 |

## Fifth Year

(Refer, also, to notes below)

| | | |
|---|---|---|
| LA 522 | Landscape Design Studio IV | 4 |
| LA 544 | Professional Practice Studio I | 1 |
| LA 562 | Architecture II | 2 |
| EI 550 | Fundamentals of City & Regional Planning | 3 |
| †Professional Elective | | 3 |
| ***Elective | | 3 |
| | | 16 |

| | | |
|---|---|---|
| LA 525<br>or<br>LA 527 | Landscape Design Studio V<br>Landscape Design Studio V | 4 |
| LA 545 | Professional Practice Studio II | 2 |
| LA 547 | Principles of Professional Practice | 2 |
| F Bot 525 | Forest Ecology | 3 |
| †Professional Elective | | 3 |
| ***Elective | | 3 |
| | | 17 |

1. *All students must have completed the equivalent of college algebra and trigonometry plus high school chemistry or physics before entering third year. When these requirements are completed, this becomes a free elective. (See note 3.)
2. **Second year English courses will be chosen in consultation with Advisor.
3. ****Free Electives* to be chosen with Advisor's approval in the context of an overall plan. It is recommended that students choose electives to include related areas of study on the C. of F. campus, and to continue depth in subject areas offered at Syracuse University.
4. ****Humanities elective—usually a language course in preparation for study abroad.
5. †*Professional Electives* are to be chosen from School of Landscape Architecture course offerings or, with permission of Advisor, from adjacent disciplines directly related to professional practice.
6. Upon successful completion of the fourth year, the B.S. Degree in Environmental Studies will be awarded. A total of 127 credit hours is required for this degree.
7. Upon award of B.S. Degree in Environmental Studies, application may be made for entrance into fifth year program. Acceptance will be based on performance in environmental studies curriculum, particularly progress in Landscape Design Studios. Upon successful completion of the fifth year, the Bachelor of Landscape Architecture degree will be awarded. A total of 160 credit hours is required for this degree.

## PAPER SCIENCE AND ENGINEERING

Two options are offered in this curriculum—one providing a broad education in the paper sciences, and the other a similar course of study but with more emphasis on chemical engineering.

Students planning to enter as juniors must have a total of 66 credits or an Associate degree and acceptable transfer credits of 66 credits. These credits shall include the following core courses:

| | |
|---|---|
| English | 6 credits |
| General Chemistry | 8 credits |
| Organic Chemistry | 8 credits |
| General Physics | 8 credits |
| *Mathematics | 9 credits |
| **Economics | 6 credits |
| Electives | As required |

Students will be required to complete the regular program for the junior and senior years as listed on pages 53 and 55. In order to graduate in two years students must have completed the core courses specified above prior to the junior year.

If a student desires to take more than two years to complete his Bachelor of Science degree program, deficiencies in the core courses may be completed during the regular academic year. Credit hours for core courses taken in addition to the Associate degree cannot be substituted for credit hours in either the junior or senior year. If a student has taken a course during the first two years that is considered equivalent to any of the required courses in the final two-year program at the College of Forestry, substitution of other appropriate courses can be made but the total credit hours required for graduation will *not* be reduced.

### *Paper Science Option*

This program provides basic training in the physical sciences, mathematics, and engineering, combined with a specific understanding of the chemistry and anatomy of wood, pulping of wood, chemistry and physics of paper and paper formation, and the chemical engineering of pulp and paper processing. The option permits the student a range of elective courses with a choice between the sciences or management.

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*Paper Science Option students need analytical geometry, differential and integral calculus; Paper Engineering Option students need 3 additional credits in an advanced mathematics course beyond integral calculus.

**Desirable but not necessary for the Engineering-Science graduates.

# PAPER SCIENCE & ENGINEERING CURRICULUM
## PAPER SCIENCE OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| GF 032 | Orientation | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Phys 103 | General Physics | 4 | Engl 211 | Technical Writing | 2 |
| Acct 251 | Elementary Accounting | 3 | Phys 104 | General Physics | 4 |
| F Econ 301 | Introduction to Micro-Economics | 3 | Elective | | 3 |
| | | 17 | | | 16 |

### Junior Year

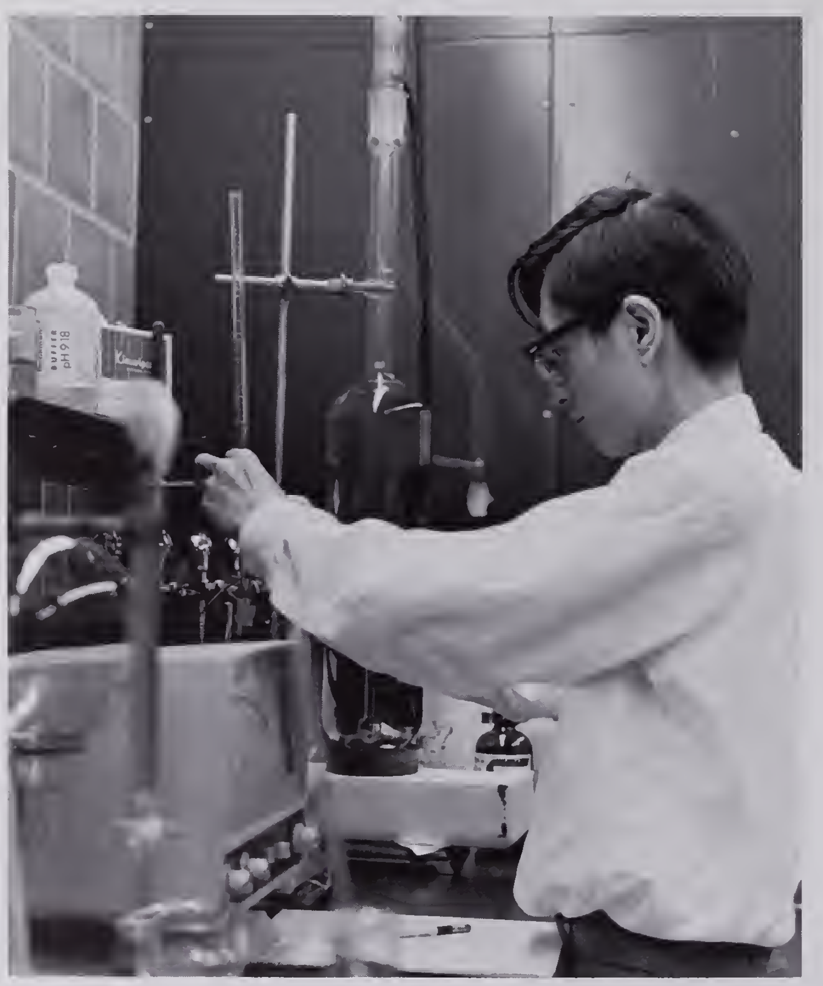
| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Chem 575 | Wood Chemistry I | 2 | Graphics 181 | Graphics I | 2 |
| F Chem 576 | Wood Chemistry II | 2 | Chem 332 | Quantitative Analysis | 2 |
| Chem 346 | Physical Chemistry | 3 | Chem 333 | Quantitative Analysis Lab | 1 |
| Chem 347 | Physical Chemistry Lab | 1 | Chem 356 | Physical Chemistry | 3 |
| PSE 300 | Introduction to the Pulp & Paper Industry | 1 | Chem 357 | Physical Chemistry Lab | 1 |
| WPE 487 | Wood Structure & Properties | 4 | PSE 301 | Pulp and Paper Processes | 3 |
| Elective | | 3 | PSE 302 | Paper Processes Lab | 1 |
| | | | PSE 570 | Principles of Mass and Energy Balance | 3 |
| | | 16 | | | 16 |

SUMMER MILL EXPERIENCE: PSE 304—Mill Experience—5 credit hours. Twelve weeks full-time pulp or paper mill employment approved by the Department between the Junior and Senior years.

### Senior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| PSE 561 | Pulping Technology | 4 | PSE 496 | Special Topics | 1 |
| PSE 565 | Paper Properties | 5 | PSE 556 | Economics of Pulp & Paper | 3 |
| PSE 572 | Pulp & Paper Unit Operations Lab I | 1 | PSE 566 | Paper Coating | 3 |
| PSE 575 | Unit Operations I: Fluid Mechanics & Heat Transfer | 3 | PSE 568 | Papermaking Processes | 3 |
| PSE 576 | Unit Operations II: Process Control and Mass Transfer | 2 | PSE 578 | Unit Operations III: Mass Transfer | 3 |
| | | | PSE 579 | Unit Operations IV: Recovery Processes Operations | 2 |
| | | 15 | | | 15 |

1. *Mathematics through Math 227 or the equivalent is required; it is recommended that students in this option also complete Math 328.
2. A total of 133 credit hours is required in this option.



## *Paper Engineering Option*

A student may earn a chemical engineering degree in one year following the completion of this option. This program is designed to provide a basic education in the physical sciences, and mathematics, with emphasis on chemical engineering. Courses include fundamental studies in wood chemistry, wood anatomy, pulping, and the chemistry and physics of paper and paper formation.

# PAPER SCIENCE & ENGINEERING CURRICULUM
## PAPER ENGINEERING OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| GF 032 | Orientation | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| *Math or Elective | | 3 | *Math or Elective | | 3 |
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| Acct 251 | Elementary Accounting | 3 | Engl 211 | Technical Writing | 2 |
| F Econ 301 | Introduction to Micro-Economics | 3 | Elective | | 3 |
| | | 17 | | | 16 |

### Junior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Chem 575 | Wood Chemistry I | 2 | Graphics 181 | Graphics I | 2 |
| F Chem 576 | Wood Chemistry II | 2 | Chem 332 | Quantitative Analysis | 2 |
| Chem 346 | Physical Chemistry | 3 | Chem 333 | Quantitative Analysis Lab | 1 |
| Chem 347 | Physical Chemistry Lab | 1 | Chem 356 | Physical Chemistry | 3 |
| PSE 300 | Introduction to the Pulp and Paper Industry | 1 | Chem 357 | Physical Chemistry Lab | 1 |
| WPE 487 | Wood Structure & Properties | 4 | PSE 301 | Pulp and Paper Processes | 3 |
| Elective | | 3 | PSE 302 | Paper Processes Lab | 1 |
| | | | PSE 570 | Principles of Mass and Energy Balance | 3 |
| | | 16 | | | 16 |

SUMMER MILL EXPERIENCE: PSE 304—Mill Experience—5 credit hours. Twelve weeks full-time pulp or paper mill employment approved by the Department between the Junior and Senior years.

### Senior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| PSE 561 | Pulping Technology | 4 | PSE 496 | Special Topics | 1 |
| PSE 565 | Paper Properties | 5 | PSE 566 | Paper Coating | 3 |
| PSE 572 | Pulp & Paper Unit Operations Lab I | 1 | PSE 568 | Papermaking Processes | 3 |
| PSE 575 | Unit Operations I: Fluid Mechanics & Heat Transfer | 3 | PSE 574 | Pulp & Paper Unit Operations Lab II | 3 |
| PSE 576 | Unit Operations II: Process Control and Mass Transfer | 2 | PSE 578 | Unit Operations III: Mass Transfer | 3 |
| | | | PSE 579 | Unit Operations IV: Recovery Processes Operations | 2 |
| | | 15 | | | 15 |

1. *Mathematics through Math 328, or the equivalent is required; it is recommended that students in this option also complete Math 585.
2. A total of 133 credit hours is required in this option.

## RESOURCES MANAGEMENT

This is the central, accredited forestry educational program of the College. The objectives of this curriculum are (1) to provide a general and well-integrated education for professional practice as foresters and land managers, and (2) to open a broad array of natural resource-related and environmental management opportunities for the individual student to pursue his own interests and abilities in particular endeavors or through advanced study.

The core of required courses presents the principles and practices basic to sound management of extensive nonurban land areas for their many values in producing timber, wildlife, water, esthetic and recreational uses. Over a third of our nation's area is forest land. The relationships of these valuable resources to modern society's needs and to the quality of our living environment are critical and increasing in importance. The core assures fulfillment of education requirements for all initial professional positions in federal and state forestry, as well as the normal requirements of industrial and private enterprises in land management. Extensive elective courses serve to broaden the student's general education, to strengthen his perceptions and integration of knowledge, or to provide a solid base for those planning graduate study in resources management or its specialties.

The curriculum offers broad opportunity and maximum credit for students interested in transferring from liberal arts or science programs in community colleges or other universities.

Recommended program of courses for students planning to transfer as entering juniors totals 64 credits or an Associate degree and include:

| | |
|---|---|
| *Physical and Biological Sciences | 12–16 credits |
| *Mathematics | 3–9 credits |
| *Social Sciences and Humanities | 15–23 credits |
| Electives | 19–23 credits |

Attendance at a 5-week Summer Session course in Field Forestry at the Pack Demonstration Forest, Warrensburg, N.Y., is required.

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*Total credits in these areas should be 45.

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1. *Six credit hours of mathematics are required: at least algebra and trigonometry.
2. **At least one of the following two courses must be chosen from these electives: Silvi 351: Meteorology and Fire Behavior, F Zool 552: Wildlife Ecology.
3. Two semesters of calculus are highly recommended to be taken prior to the junior year, particularly for students interested in graduate work.
4. Three elective courses (totalling 9 credits) must be selected from forestry and allied subject areas.
5. Three elective courses (totalling 9 credits) must be selected from the humanities and social science areas with at least one course from each area.
6. Additional electives should be chosen from the humanities and social science areas or from natural and physical sciences not directly related to the student's course of study.
7. A total of 136 credit hours is required in this curriculum.

## RESOURCES MANAGEMENT CURRICULUM[1]

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| **Freshman Year** | | | | | |
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| *Math | | 3 | *Math | | 3 |
| Elective | | 3 | Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 | | | |
| | | 17 | | | 17 |
| **Sophomore Year** | | | | | |
| F Bot 210 | Dendrology 1 | 2 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Gr 280 | Technical Drawing | 1 | Geol 105 | Introductory Geology | 3 |
| F Mgt 201 | Plane Surveying | 3 | Phys 104 | General Physics | 4 |
| Phys 103 | General Physics | 4 | Elective | | 3 |
| Elective | | 3 | Elective | | 3 |
| Elective | | 3 | | | |
| | | 16 | | | 16 |
| SUMMER SESSION IN FIELD FORESTRY<br>5 weeks, 6 credit hours: Required of all students following the sophomore year and prior to registration for the junior year (including junior year transfer students who elect this curriculum). | | | F Biol 301 | Field Biology | 1 |
| | | | F Mgt 303 | Introduction to Forest Measurements | 1 |
| | | | Silvi 302 | Silvics | 1 |
| | | | Res Mgt 304 | Silviculture-Resource Management | 3 |
| | | | | | 6 |
| **Junior Year** | | | | | |
| A M 571<br>or<br>A M 591 | Introduction to Statistical Analysis<br><br>Introduction to Probability and Statistics | 3 | F Mgt 522 | Mensuration | 3 |
| F Bot 330 | Plant Physiology | 2 | F Ento 300 | Principles of Forest Entomology | 2 |
| F Econ 301 | Introduction to Micro-Economics | 3 | F Mgt 340 | Harvesting | 2 |
| Silvi 332 | Soils | 3 | Silvi 521 | Principles of Silviculture | 3 |
| Elective | | 3 | WPE 486 | Elementary Wood Technology | 2 |
| Elective | | 3 | Elective | | 3 |
| | | 17 | | | 15 |
| **Senior Year** | | | | | |
| F Econ 510 | Principles of Forestry Economics | 3 | F Mgt 572<br>or<br>Silvi 540 | Principles of Outdoor Recreation<br><br>Forest Hydrology | 3 |
| F Mgt 554 | Forest Administration and Policy | 3 | F Mgt 552 | Management Planning and Operations | 3 |
| Silvi 524 | Practices of Silviculture | 3 | Res Mgt 502 | Resources Management or Other Forestry Elective | 3 |
| WPE 304 | Introduction to Forest Products | 2 | **Electives | | 6 |
| **Electives | | 6 | | | |
| | | 17 | | | 15 |

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[1] To be replaced in 1972 by a new curriculum currently in process of development.

## WOOD PRODUCTS ENGINEERING

Four options are available in this curriculum: Building Construction, Wood Science, Production Systems Engineering, and Materials Marketing. All of these options allow two-year college students to transfer in as full juniors as outlined in the following options.

Students with an Associate degree will be required to complete the regular programs for the junior and senior years as listed on the above pages. In order to graduate in two years, Associate degree holders must have completed the core courses specified above or completed them in a summer session prior to the junior year. If a student desires to take more than two years to complete his Bachelor of Science degree, deficiencies in the core courses may be completed during the regular academic year. Credit hours for core courses taken in addition to the Associate degree cannot be substituted for credit hours in either the junior or senior years. If a student has taken a course during the first two years that is considered equivalent to any of the required courses in the final two-year program at the College of Forestry, substitution of other appropriate courses can be made but the total credit hours required for graduation will *not* be reduced.

### *Wood Science Option*

This option provides an opportunity for students to obtain the necessary scientific background for research and development in wood-related industries, or for graduate study leading to fundamental research and/or college teaching.

Because of the breadth of wood science, and in order to accommodate the particular needs or interests of students, two areas of emphasis are provided within the option. Those students primarily interested in the biological approach in studying wood, and in its development in the living tree, will concentrate in the anatomical or biophysical aspects of wood science. Those interested particularly in physical wood science will emphasize the basic physical sciences. In either case, at least nine credit hours of elective courses should be taken in the humanities and social sciences.

Transfer students with an Associate degree or its equivalent may enter with full junior standing if their course work includes general and organic chemistry, physics, and mathematics through topics in calculus. Any deficiencies in botany or zoology may be fulfilled later. These students can expect to graduate in four semesters.

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1. *It is recommended that at least 9 credit hours of these electives be in the social sciences or humanities.
2. A total of 131 credit hours is required in this option.

# WOOD PRODUCTS ENGINEERING CURRICULUM
## WOOD SCIENCE OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Zool 100 | General Zoology | 4 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| Math 125 | Elementary Analytic Geometry | 3 | Math 226 | Differential Calculus | 3 |
| Elective | | 3 | Gr 181 | Graphics I | 2 |
| Phys Ed or ROTC | | 3 | Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 | | | |
| | | 17 | | | 16 |

### Sophomore Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Chem 221 | Organic Chemistry I | 3 | F Chem 223 | Organic Chemistry II | 3 |
| F Chem 222 | Organic Chemistry Lab I | 1 | F Chem 224 | Organic Chemistry Lab II | 1 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| Math 227 | Integral Calculus | 3 | Math 328 | Topics in Calculus | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| *Elective | | 3 | F Econ 290 | Introduction to Economics for Forestry | 3 |
| | | 16 | | | 16 |

### Junior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| Chem 346 | Physical Chemistry | 3 | Chem 356 | Physical Chemistry | 3 |
| WPE 322 | Mechanical Processing | 3 | WPE 526 | Fluid Treatments | 3 |
| F Bot 210 | Dendrology I | 2 | WPE 520 | Polymeric Adhesives and Coatings | 3 |
| A M 591 | Introduction to Probability and Statistics | 3 | *Electives | | 6 |
| Wood Anatomy Sub-option: | | 3 | | | |
| F Biol 330 | Principles of General Physiology | | | | |
| or | | | | | |
| Wood Physics Sub-option: | | | | | |
| A M 360 | Introduction to Computer Programming | | | | |
| WPE 487 | Wood Structure & Properties | 4 | | | |
| | | 18 | | | 15 |

WPE 390: Field Trip. 2 credit hours. A 2-week field trip at the end of the junior year.

### Senior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| WPE 522 | Composite Materials | 3 | WPE 502 | Timber Mechanics | 4 |
| Wood Anatomy Sub-option: | | | WPE 498 | Research or Design Problem | 3 |
| WPE 585 | Microtechnique and Photomicrography (3) | 6–7 | Wood Anatomy Sub-option: | | |
| Phys 261 | Introduction to Modern Physics (3) | | WPE 588 | Commercial Timbers of the World 3 | |
| Wood Physics Sub-option: | | | F Bot 585 | Plant Anatomy (3) | |
| M E 225 | Engineering Mechanics (4) | | Wood Physics Sub-option: | | 6 |
| F Chem 556 | Polymer Properties (3) | | M E 226 | Engineering Mechanics (3) | |
| WPE 566 | Wood-Water Relationships | 3 | F Chem 520 | Nuclear Chemical Techniques (3) | |
| *Electives | | 2–3 | *Elective | | 3 |
| | | 15 | | | 16 |

**Building Construction Option**

The current pressures for new housing and urban reconstruction have led to an option that develops a deep awareness of the effects of construction on the environment, as well as the efficient use of materials, particularly wood. There is an increasing demand for technically trained specialists in the construction industry and supporting fields, who have the skills to efficiently use the wide variety of wood-based building materials with consideration to their place in respect to other materials and to the purpose of the end product.

Transfers with AAS degrees in Civil-Construction Technology will be accepted without loss of credit. However, they must make up any courses prerequisite to the upper division requirements they lack.

Transfers from other areas of study will require special program adjustments on an individual basis by the department.

The specialty electives are designed to allow the opportunity for concentration areas related to the individual's career objectives. It is felt that the wide range of construction activities found in practice cannot be adequately serviced by a rigid program of study. This factor along with student concern in having curriculum participation indicate the need for a flexible program.

Suggested areas and available courses have been grouped below. Many courses are not mentioned, but most relevant material should be under the following areas:

*Engineering*

Structural Analysis
Metallurgy
Adv. Soil Mechanics
Photogrammetry
Heat Transfer
Transportation
Systems Analysis

*Management*

Marketing
Business Law
Accounting
Finance
Industrial Management
Operations Research
Human Factors

*Environment*

Urban Planning
Sanitary Engineering
Waste Water Treatment
Environmental Sanitation
Land Use
Landscape Architecture
General Ecology

# WOOD PRODUCTS ENGINEERING CURRICULUM
## BUILDING CONSTRUCTION OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| Math 125 | Elementary Analytic Geometry | 3 | Math 226 | Differential Calculus | 3 |
| *Elective | | 3 | Gr 181 | Graphics I | 2 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 | | | |
| | | 17 | | | 15 |

### Sophomore Year

| | | | | | |
|---|---|---|---|---|---|
| MEE 225 | Engineering Mechanics | 4 | F Engr 301 | Plane and Geodetic Surveying | 3 |
| F Econ 301 | Introduction to Micro-Economics | 3 | E I 113 | Introduction to Environmental Studies | 3 |
| Math 227 | Integral Calculus | 3 | Phys 104 | General Physics | 4 |
| Phys 103 | General Physics | 4 | Geol 105 | Introductory Geology | 3 |
| *Elective | | 3 | *Elective | | 3 |
| | | 17 | | | 16 |

### Junior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 322 | Mechanical Processing | 3 | WPE 502 | Timber Mechanics | 4 |
| WPE 487 | Wood Structure and Properties | 4 | WPE 520 | Polymeric Adhesives & Coatings | 3 |
| A M 360 | Introduction to Computer Programming | 3 | F Engr 342 | Hydraulics in Construction | 4 |
| Acctg 251 | Elementary Accounting | 3 | Acctg 252 | Elementary Accounting | 3 |
| **Specialty Elective | | 3 | CIE 326 | Engineering Materials | 3 |
| | | 16 | | | 17 |

WPE 390—Field Trip—2 credit hours. A two-week field trip at the end of the junior year.

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 522 | Composite Materials | 3 | WPE 544 | Materials Marketing | 3 |
| F Engr 410 | Structures | 4 | WPE 550 | Construction Equipment | 3 |
| F Engr 531 | Soil Mechanics for Engineers | 3 | WPE 554 | Construction Management | 3 |
| **Specialty Elective | | 3 | **Specialty Elective | | 3 |
| *Elective | | 3 | *Elective | | 3 |
| | | 16 | | | 15 |

1. *It is recommended that students elect at least 12 credit hours from the social sciences or the humanities.
2. **Refer to College Catalog for listings of possible areas.
3. A total of 131 credit hours is required in this option.

**Production Engineering Option**

The goal of this option is to provide an education in the areas of process development, plant design, and production management of modern industries utilizing wood, its plastic and other composites, and related raw materials.

The program establishes a solid foundation in basic sciences and in applied mathematics, including computer programming and engineering statistics. On this is built a sequence of studies in engineering and management sciences essential to planning and development of production processes, and to design and operation of modern manufacturing facilities.

Modern production plants are complex systems of machines, men, money, and management, integrated for production in highly competitive markets. The graduates of this option must be familiar with planning, design, operation, and the economics of entire systems.

Transfer students with an Associate degree or its equivalent may enter with full junior standing if their course work includes general chemistry, physics and mathematics through topics in calculus.

Production Engineering students may arrange with their advisors to prepare for special course options leading to admission into a Bachelor of Science degree program at Syracuse University in either Industrial or Mechanical Engineering.

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1. *It is recommended that students elect at least 9 credit hours from the social sciences or the humanities.
2. A total of 129 credit hours is required for graduation.

# WOOD PRODUCTS ENGINEERING CURRICULUM
## PRODUCTION SYSTEMS ENGINEERING OPTION

### Freshman Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Bot 100 | General Botany | 4 | F Econ 300 | Introduction to Macro-Economics | 3 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| Math 125 | Elementary Analytic Geometry | 3 | Math 226 | Differential Calculus | 3 |
| *Elective | | 3 | Gr 181 | Graphics I | 2 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 | | | |
| | | 17 | | | 15 |

### Sophomore Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| F Econ 301 | Introduction to Micro-Economics | 3 | A M 360 | Introduction to Computer Programming | 3 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| Math 227 | Integral Calculus | 3 | Math 328 | Topics in Calculus | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| *Elective | | 3 | *Elective | | 3 |
| | | 15 | | | 15 |

### Junior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| WPE 322 | Mechanical Processing | 3 | F Mgt 561 | Operation Cost Control | 3 |
| WPE 487 | Wood Structure and Properties | 4 | WPE 502 | Timber Mechanics | 4 |
| I E 548 | Engineering Economic Analysis | 3 | WPE 520 | Polymeric Adhesives and Coatings | 3 |
| A M 591 | Introduction to Probability and Statistics | 3 | WPE 526 | Fluid Treatments | 3 |
| MEE 225 | Engineering Mechanics | 4 | Tech. Elective | | 3 |
| | | 17 | | | 16 |

WPE 390—Field Trip—2 credit hours. A two-week field trip at the end of the junior year.

SUMMER EXPERIENCE: 2 months experience in an approved wood products or allied firm or laboratory is required. A written report, to be presented in WPE 497, is required. Usually fulfilled between the junior and senior years.

### Senior Year

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| E E 221 | Electrical Science I | 3 | E E 222 | Electrical Science II | 3 |
| I E 575 | Industrial Methods and Systems Engineering | 3 | WPE 498 | Research or Design Problem | 3 |
| M E 351 | Fundamentals of Thermodynamics I | 3 | WPE 572 | Production Systems II: Synthesis | 3 |
| WPE 570 | Production Systems I: Analysis | 3 | *Electives | | 6 |
| WPE 522 | Composite Materials | 3 | | | |
| WPE 497 | Senior Seminar for Wood Products Engineering Majors | 2 | | | |
| | | 17 | | | 15 |

### *Materials Marketing Option*

The marketing of wood products, with their related materials and services, brings together the essential elements of production, distribution, and consumption of our major renewable material resource. Preparation for successful marketing involves development of basic knowledge of the materials and their properties, their efficient processing and fabrication, and the effective use of their products. Because marketing channels vary widely in nature, size and complexity to meet the equally varied needs of commercial, industrial, and consumer markets, preparation must also include the sound general business orientation required of any segment of the economy.

This option is designed to educate students for professional careers in technical sales and management of distributive enterprise in the wood products and allied industries.

Transfer students with an Associate degree or its equivalent may enter with full junior standing if their course work includes general chemistry, physics, and mathematics through analytic geometry. These students can expect to graduate in four semesters.

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1. **Mathematics requirements include Math 125: Analytic Geometry and Applied Mathematics 571 or equivalents. College algebra and trigonometry may be taken in the freshman year prior to completion of these mathematics requirements in the sophomore year.
2. ***Electives are to be from the humanities or the social sciences.
3. A total of 129 credit hours is required in this option.

# WOOD PRODUCTS ENGINEERING CURRICULUM
## MATERIALS MARKETING OPTION

| *First Semester* | | *Credit Hours* | *Second Semester* | | *Credit Hours* |
|---|---|---|---|---|---|
| | **Freshman Year** | | | | |
| F Bot 100 | General Botany | 4 | Pub Add 215 | Public Speaking | 3 |
| Chem 106 | General Chemistry | 3 | Chem 116 | General Chemistry | 3 |
| Chem 107 | General Chemistry Lab | 1 | Chem 117 | General Chemistry Lab | 1 |
| Engl 101 | Freshman English | 3 | Engl 102 | Freshman English | 3 |
| **Math or Elective | | 3 | **Math or Elective | | 3 |
| ***Elective | | 3 | ***Elective | | 3 |
| Phys Ed or ROTC | | 0 | Phys Ed or ROTC | | 0 |
| G F 032 | Orientation | 0 | | | |
| | | 17 | | | 16 |
| | **Sophomore Year** | | | | |
| Acct 251 | Elementary Accounting | 3 | Acct 252 | Elementary Accounting | 3 |
| Engl 210 | Advanced Composition and Literature | 2 | Engl 211 | Technical Writing | 2 |
| **Math or Elective | | 3 | **Math or Elective | | 3 |
| Phys 103 | General Physics | 4 | Phys 104 | General Physics | 4 |
| ***Elective | | 3 | F Econ 290 | Introduction to Economics for Forestry | 3 |
| Graphics 280 | Technical Drawing | 1 | | | |
| | | 16 | | | 15 |
| | **Junior Year** | | | | |
| WPE 322 | Mechanical Processing | 3 | Fin 355 | Money and Banking | 3 |
| AM 360 | Introduction to Computer Programming | 3 | WPE 520 | Polymeric Adhesives and Coatings | 3 |
| Mktg 355 | Marketing Principles, Methods, and Problems | 3 | WPE 526 | Fluid Treatments | 3 |
| WPE 487 | Wood Structure and Properties | 4 | Mktg 356 | Distribution Management | 3 |
| ***Elective | | 3 | ***Elective | | 3 |
| | | 16 | | | 15 |

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

SUMMER EXPERIENCE: 2 months experience in an approved wood products or allied firm or laboratory is required. A written report, to be presented in WPE 497, is required; usually fulfilled between the junior and senior years.

### Senior Year

| | | | | | |
|---|---|---|---|---|---|
| WPE 522 | Composite Materials | 3 | WPE 544 | Materials Marketing | 3 |
| WPE 497 | Senior Seminar for Wood Products Engineering Majors | 2 | F Econ 520 | Economics for Wood-Using Industries | 3 |
| WPE 442 | Light Construction | 3 | Bus Law 357 | The Law of Contracts | 3 |
| WPE 402 | Elementary Timber Mechanics | 3 | Fin 356 | Corporation Finance | 3 |
| Bus Law 355 | Basic Concepts and Applications | 3 | ***Elective | | 3 |
| ***Elective | | 3 | | | |
| | | 17 | | | 15 |

# VI

# SUMMER SESSIONS

A wide array of courses at the undergraduate and graduate levels is available to College of Forestry students in the Syracuse University summer sessions. Research problems, thesis, and special courses regularly available at the College may be taken also during the summer sessions. Syracuse University courses taken must be related directly to the student's planned program and be approved by his faculty advisor.

*Transfer students* are advised to review their special course needs with the Office of Admissions and to consider summer session attendance where completions of background courses in mathematics, chemistry, economics, or general education subjects are necessary for fall semester entry in full standing. These courses may be taken at any accredited institution. Summer session tuition charges at the College are at the rate of $13.50 per credit ($20.00 for out-of-state residents) for undergraduate courses and $20.00 per credit for graduate courses. Information on courses to be offered, session dates, and registration procedures are available upon request from the Office of Student Services or the Office of Graduate Studies at the College.

## Summer Sessions in Field Forestry
## Charles Lathrop Pack Demonstration Forest
## Warrensburg, New York

A five-week (6-credit) program of courses emphasizing the field application of forestry principles and practices is conducted in two sessions each summer at the Pack Demonstration Forest near Warrensburg, New York. These sessions are coordinated with College and Syracuse University summer sessions, permitting students to attend an on-campus session and a field session in the same summer. The courses presented in the Field Forestry program are listed in both the Forest Biology and Resources Management curriculums sections. Room, board, and fee charges approximating $160 are levied. No tuition charge is made for matriculated students since the courses in this session are coordinated with and considered an integral part of the fall semester of the junior year. *Transfer students* planning to enroll in either the Resources Management or Forest Biology curriculum should write to the Director, Summer Session in Field Forestry at the College for additional information on session dates and special requirements.

Completion of the Field Forestry program is required of students in Resources Management prior to the fall term of their junior year. Students in Forest Biology are also required to attend either this session or the session at Cranberry Lake Biological Station, although attendance at other approved biological field stations may be arranged with the Curriculum Director.

## Summer Session in Environmental Biology
## Cranberry Lake Biological Station
## Charles Lathrop Pack Demonstration Forest
## Cranberry Lake, N. Y.

The Summer Session in Environmental Biology provides graduate students and selected undergraduate biology majors with the opportunity to continue their studies and research at a lake-and-forest field station. The summer program is jointly sponsored by the School of Biology, Chemistry, and Ecology of the State University College of Forestry and the Department of Biological Sciences at the State University of New York at Albany. Qualified students from other institutions are welcome.

Cranberry Lake is ideally suited for a biology summer program. The surrounding topography is rolling hill and lake country dotted with numerous small ponds, closed bogs, and stream drainages. The lake itself is the third largest body of water in the Adirondacks. Because eighty percent of the shoreline is in State ownership, the lake remains relatively unspoiled by recreational developments and is free of pollution problems. Much of the original forest cover in the region was harvested years ago; today a rich variety of community types occupy those sites as the vegetation reverts again to the natural forest condition. The remaining virgin forests also provide the student with many examples of stable forests, each type reflecting the particular environmental conditions controlling forest development. A wealth of wildlife parallels the variety of cover types over the region.

The Pack Forest at Cranberry Lake, at which the biology station is now located, is the former site of the Sophomore Summer Camp, 1915–1965. Facilities include 12 cabins housing 6–8 students each; four classroom-laboratories; dining facilities capable of serving 150; faculty quarters and cabins; a headquarters building; a recreation hall; and several smaller, supporting buildings. Isolated across six miles of water, the Station generates its own electrical power and provides a running water and sanitation system. Telephone service is available to the outside, and mail is delivered to the Station daily. At least one boat trip a day and several on the weekends are made to the marina or village.

The eight-week program extends from late June into mid-August and is divided into two four-week sessions. Courses are taught in blocks of two-day units, permitting concentrated study without hourly interruptions. Because the Cranberry Lake Biological Station is the only field biology station in the State University system stressing graduate training, all courses are presented at a rigorous, advanced pace. College of Forestry students planning to attend should be preparing for graduate study and completion of their junior year biology sequence with a six semester minimum cumulative average of 2.5 is recommended.

The upper level courses constituting the undergraduate core are offered each summer; graduate level courses generally are given on an alternate year basis. The courses are:

| *Number* | | *Title* | *Credits* | *Duration & Session* |
|---|---|---|---|---|
| | | *Upper level courses* | | |
| F.Biol. | 521 | Ecology of Freshwaters............ | 2 | 4 weeks I |
| F.Bot. | 522 | Ecology of Forest Communities .... | 2 | 4 weeks II |
| F.Zool. | 523 | Invertebrate Ecology ............. | 2 | 4 weeks I |
| F.Zool. | 524 | Vertebrate Ecology ............... | 2 | 4 weeks II |
| F.Biol. | 497 | Seminar in Forest Biology ........ | 1 | 8 weeks I–II |
| F.Biol. | 498 | Research Problem in Biology ...... | 1–3 | 4–8 weeks I–II |
| | | *Graduate level courses* | | |
| F.Biol. | 515 | Advanced Limnology ............. | 4 | 8 weeks I–II |
| F.Bot. | 517 | Adirondack Flora ................ | 1–2 | 4–8 weeks I–II |
| F.Bot. | 527 | Bryoecology ..................... | 2 | 4 weeks I |
| F.Ento. | 550 | Forest & Aquatic Insects .......... | 2 | 4 weeks I |
| F.Zool. | 575 | Behavioral Ecology .............. | 2 | 4 weeks I |
| F.Biol. | 720 | Physiological Ecology ............ | 2 | 4 weeks II |
| F.Biol. | 721 | Population Dynamics ............. | 2 | 4 weeks II |
| F.Biol. | 722 | Bioclimatology .................. | 2 | 4 weeks II |
| F.Bot. | 798 | Research in Forest Botany ........ | TBA | 8 weeks I–II |
| F.Zool. | 798 | Research in Forest Zoology ........ | TBA | 8 weeks I–II |
| F.Ento. | 798 | Research in Forest Entomology .... | TBA | 8 weeks I–II |
| F.Bot. | 899 | Master's Thesis .................. | TBA | 8 weeks I–II |
| F.Zool. | 899 | Master's Thesis .................. | TBA | 8 " " |
| F. Ento. | 899 | " " | " | " " |
| F.Bot. | 999 | Doctoral Thesis ................ | " | " " |
| F.Zool. | 999 | " " | " | " " |
| F.Ento. | 999 | " " | " | " " |
| F.Biol. | 997 | Biology Seminar ................. | 1 | 8 weeks I–II |

Maximum course load is 4 credits each session or 9 credits for the two sessions.

State University tuition charges prevail at the Biology Station; undergraduates pay $18.50 a credit if State residents and $30.00 if out-of-state; graduates from New York are charged $27.00 and non-residents $33.50. Room and board charges are $105.00 each session. Syracuse students register at the College of Forestry through the Associate Director; all other students register through Dr. Donald McNaught, Program Director, Department of Biological Sciences, SUNY Albany, 1400 Washington Avenue, Albany, N.Y. 12203. Because facilities at the biology station are limited, applications should be received prior to May 1; late registration is accepted as space permits.

# VII

# GRADUATE STUDY

The stimulating interaction of faculty and students working together to understand and solve today's challenging problems creates the major background for graduate study at the College. A wide array of excellent supporting facilities and equipment completes the setting for creative study. In this environment the student takes a program of advanced courses especially designed to meet his personal professional and academic objectives as a prelude to original investigation. Participation in seminars and colloquia with faculty and visiting scholars further expands his intellectual horizons. Graduate study culminates in individual research and creative achievement.

During the graduate years a student develops his ability to think critically and analytically, to design experiments and plan research, to work effectively with the basic research tools as well as with specialized equipment, and to accept the rigorous discipline of purposeful study toward a specific goal. It is a time of discovery and excitement, of answers and new insights—the realization of personal creativity and the deep satisfaction of scholarship.

The demand by industry, government, and educational organizations for scientists and scholars is ever present. Education through the doctorate is expected of those planning to enter college or university teaching. The Master or Doctor's degree is a requirement for many industrial or governmental research positions and employers are always seeking graduates with one or more advanced degrees for managerial positions. But a graduate education is more than an occupational requirement. Our society is increasingly in the hands of those who have broad foresight and reasoned judgment in applying sociological and technical knowledge to guide human and environmental forces. Modern civilization requires persons who can think objectively and constructively, and who can act creatively and responsibly.

## GRADUATE DEGREES

The College of Forestry offers graduate education in professional and scientific fields leading to:

Master of Science (M.S.)
Master of Forestry (M.F.)
Master of Landscape Architecture (M.L.A.)
Doctor of Philosophy (Ph.D.)

## POST-DOCTORAL OPPORTUNITIES

Advanced education and experience opportunities for professional people and scientists are abundant at the College. From 25 to 30 Post-Doctoral Fellows and Associates are in residence each year to receive advanced research experience or professional education under the guidance of faculty members with international stature. Modern facilities and instrumentation help to make the program meaningful and rewarding.

## SYRACUSE UNIVERSITY

The College of Forestry is a unit of the State University of New York. There are six major buildings located on a 12-acre campus which is immediately adjacent to the campus of Syracuse University. This mix of a State operated College and a large privately operated University Center is a stimulating environment for graduate education.

Syracuse University is one of the excellent private universities of the United States with an undergraduate student body of over 10,000 and more than 3,000 graduate students. College of Forestry graduate students may utilize any relevant courses available at Syracuse University in developing their graduate education. This gives each student the advantages of working closely with an excellent College faculty, and at the same time having access to the varied capabilities of a large University Center.

College of Forestry graduate students have all the privileges of students of Syracuse University. They are encouraged to take advantage of all the social, athletic and cultural activities which this stimulating University Center provides.

## GRADUATE FACULTY

The faculty of the College includes 123 individuals with Professorial rank (59 Professor, 42 Associate Professor, and 22 Assistant Professor). The faculty list on pages 149–162 gives the title and academic degrees of each individual. Those who are members of the Graduate Faculty are marked with an asterisk (*).

The departmental descriptions given on pages 79–99 indicate the faculty of that department and their area of special research interest. In addition, members of College and University research centers and institutes participate in and direct graduate student programs. These include:

*Empire State Paper Research Institute:* DENCE (Organic Chemistry and Lignin Reactions); LEOPOLD (Organic Chemistry and Mechanical Properties of Fibers and Paper); LUNER (Mechanical and Surface Properties of Fibers, Films, and Paper); MARK (Fiber Physics); MARTON (Paper Properties, Microscopy, and Pulping).

*U.S. Forest Service Cooperative Recreation Research Unit:* SHAFER (Forest Recreation Research); ECHELBERGER (Forest Recreation Research); MOELLER (Forest Recreation Research).

*U.S. Forest Service Cooperative Watershed Management Research Unit:* LEONARD (Watershed Management).

## RESEARCH

Graduate education and research are so mutually dependent that they must be considered together for a realistic understanding of the College's program. Research is a major responsibility of the College required by its charter, and has been traditionally an integral part of its total academic effort.

The objectives of the College in carrying out a vigorous research program are to provide education in science and technology; to provide an environment for professional growth, the development of creative thought, and the mastery of investigative techniques; and to create new knowledge, providing a growing resource of information for the people of New York and the nation. The latter objective constitutes an obligation and responsibility of the College, as a publicly supported professional institution, dealing with forest resources and environmental matters.

To support these objectives and obligations the State University of New York provides a budget for Organized Research which is currently about $750,000 annually. In addition, extra-mural research support in the form of grants and contracts amounts to over $1,000,000 annually. This extra-mural support comes from National Science Foundation, Department of Defense, National Institutes of Health, the McIntire-Stennis Program of the U.S.D.A., the U.S. Forest Service, New York Department of Environmental Conservation, other government agencies, private foundations and industry.

Much graduate student research work is directly related to continuing programs of faculty research, and in many cases graduate students receive financial assistance from these programs.

Several research institutes and centers have been established at the College to promote research. These include the Empire State Paper Research Institute (supported by 51 companies in 13 countries), the Cellulose Research Institute, the State University Polymer Research Center, the Applied Forestry Research Institute, and the Archer and Anna Huntington Wildlife Forest Station. The United States Forest Service cooperates with the College through the Cooperative Forest Recreation Research Unit. Forest Service personnel are assigned to the College and work directly with the faculty and graduate students in developing research programs.

# FINANCIAL ASSISTANCE

## ASSISTANTSHIPS, FELLOWSHIPS, AND SCHOLARSHIPS

The College awards a substantial number of assistantships, fellowships, and scholarships to qualified graduate students each year. The number of students receiving these awards varies from year to year, but recently almost three quarters of all graduate students have received such support. In some cases it is not possible to provide a stipend at the start of the graduate study period, but such support is often provided after the student has demonstrated his competence.

Students may indicate their interest in a type of financial assistance on the graduate application form. Students on fellowships or assistantships must devote full-time to graduate study and are expected to register for 12 semester hours of credit each semester. Students seeking financial assistance should complete their applications before March to ensure full consideration for an award.

### *College Assistantships*

Assistantships are awarded students of demonstrated scholarship whose education and experience enables them to assist in laboratory instruction and research. The amount of the assistantships is about $3,400 per year. Students on assistantships carry 12 credit hours of course work and research per semester. In addition, tuition is waived for holders of assistantships.

### *Special Fellowships and Assistantships*

Fellowships and assistantships sponsored by industries, associations, and foundations are available in several departments. While the amount of stipends varies, they range from $2500 to $5000 a year. Holders of these special fellowships and assistantships are required to confine the major part of their research activities to definitely specified fields. Tuition is either waived or provided by sponsors.

### *Memorial Graduate Fellowships*

Each year the College awards one or more Memorial Graduate Fellowships to individuals of outstanding merit. These awards provide a stipend of $4,000 per year and a tenure of three years. In addition, a dependency allowance of up to $1,000 per year is provided and tuition is waived.

### *National Defense Education Fellowships*

Graduate fellowships are available under Title IV of the National Defense Education Act in most of the Departments. Stipends begin at $2400 for a 12-month period. An additional allowance of $500 is available for each dependent. Fellowship tenure is for 3 years with the stipend increasing $200 each year.

These fellowships are limited to doctoral students planning college teaching careers. Tuition and fees are waived. Support for these fellowships comes from the Office of Education of the United States Department of Health, Education, and Welfare.

### *Tuition Waiver Scholarships—Foreign Students*

Tuition waivers may be awarded to a limited number of foreign students judged to possess special academic capabilities and with demonstrated financial need, who are prepared to contribute to furthering international understanding and good will. Tuition waivers also are made available on a reciprocal basis to selected foreign students in special cooperative programs maintained between certain foreign institutions and the College. The student does not receive any actual cash payment, but the tuition charge is waived. Requests for such tuition waivers may be made on the graduate application form.

## SCHOLAR INCENTIVE PROGRAM

Qualified New York State residents are eligible for Scholar Incentive Program grants and State University Grants-in-Aid which vary with the net taxable family income of students and the level of study, and provide substantial reductions in tuition. For details, contact the Financial Aids Officer at the College of Forestry.

## LOANS

Graduate students may be eligible for various types of educational loans. The New York Higher Education Assistance Corporation offers loans to residents which are interest free until after college, and then draw 7* per cent annual interest. Repayment terms are arranged after graduation.

A graduate student who is a U.S. citizen and who needs financial assistance may borrow up to $2,500 a year under the Student Loan Program of the National Defense Education Act of 1958. No interest will accrue until 9 months after leaving college, and part of the loan will be cancelled if the student becomes a public elementary or secondary school teacher or college teacher. A 10-year repayment period is allowed.

## OTHER FORMS OF SELF SUPPORT

Graduate students without assistantships or fellowships may be employed at an hourly rate to assist in laboratories and other College activities. Such hourly employment does not include free tuition.

Employment also may be sought on a part-time basis through Department Chairmen, the Student Services Office of the College, or the Syracuse University Placement Office.

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*Effective on loans made after 4/1/69.

## TUITION AND FEES

Graduate tuition and fee charges are $400 per semester for N.Y. State residents and $500 per semester for others. Student activity fees are $12.50 per semester. A commencement fee of $25.00 is charged at the time of graduation.

## EXPENSES

Living expenses are subject to considerable variation. Many graduate students live in private homes where prices range from $12–15 per week for a single room, and from $15–20 per week or more for double room. Married students may be provided apartments in Syracuse University housing units at charges which are below those available in privately owned buildings. Expenses for textbooks and supplies average $125 or more a year. Personal expenses vary depending on needs and tastes.

All graduate students are required to have accident and sickness insurance. Fellowships funded through the State University Research Foundation are required to take the health and accident insurance available through the Foundation.

## REQUIREMENTS FOR DEGREES

The College confers the degrees of Master of Science, Master of Forestry, Master of Landscape Architecture, and Doctor of Philosophy.

Graduate programs are flexible and developed individually. Each program is planned by the major professor with the student to meet his particular academic and professional needs. Sometimes this includes undergraduate courses for which no graduate credit can be given. In every case emphasis is placed on outlining a study program leading to a high level of scholarly achievement.

An entire program for each student is usually planned during the first weeks of the academic year. It must be approved by the major professor, department chairman, and Dean of Graduate Studies. The program is modified as required upon recommendation of the major professor and with approval of the Dean of Graduate Studies. A thesis committee consisting of the major professor and two other faculty members is appointed early in each student's study program.

***Master*** All programs leading to the Master of Science, Master of Forestry, and Master of Landscape Architecture degrees require at least 30 semester hours of graduate credit. Graduate-level course work (passed with an average grade of at least B) takes up 12 to 24 hours. The remaining credit-hour requirement is met by submitting a thesis presenting the results of original research. Acceptance of the thesis depends on clear demonstration of ability to search and evaluate pertinent literature independently, to plan and carry through independent and important investigation, to interpret the significance of findings, and to present the subject in a well-organized, lucid, and scholarly thesis. The student must pass a final oral examination in which he defends his thesis and demonstrates his knowledge of related subject areas.

Candidates for Master degrees must spend at least two semesters in residence at the College of Forestry.

**Ph.D.** Quality of work is especially emphasized for the Doctor of Philosophy degree. The student is required to penetrate the frontier of knowledge in his particular field and make a definite contribution to this knowledge. He is required to demonstrate original scholarship of a high order in his search and evaluation of literature, in the planning, execution, and interpretation of his own research, and in the presentation of his findings in a thesis. Subsequent publication in a scholarly journal is expected.

There is no minimum course work requirement for the Ph.D. Each student must pass a qualifying examination before being admitted to candidacy. This examination consists of a preliminary examination taken early in the period of residence to assist in planning a course work and independent study program, and a written and oral examination to test breadth and depth of knowledge. There is no College-wide language requirement. However, competence in a foreign language, statistics, computer programming, or other "tools" may be required where they are relevant to the student's field of study. A candidate for the Ph.D. degree with only a Bachelor degree must be in residence for at least two full academic years. A candidate having a Master's degree must be in residence for at least one full academic year. The final requirement is the presentation and defense of the Ph.D. thesis or dissertation which must represent an original contribution to knowledge.

## ADMISSION REQUIREMENTS

Admission to graduate study will be granted only to applicants with at least a Bachelor's degree from a recognized institution, whose preparation has been suitable in quality and content for the proposed field of major study. Applicants will be evaluated on the basis of the following: (1) their academic record should show approximately a "B" or 80% average for the junior and senior years; (2) Graduate Record Examination Aptitude scores and in some cases, subject matter (advanced) tests indicative of graduate study ability; (3) supporting letters of recommendation, and (4) where appropriate other evidence of scholarly achievement and potential. Priority in admission is given applicants who have high scholastic standing.

All applicants are required to submit Graduate Record Examination aptitude scores where subject matter (advanced) test scores are required. This is indicated in the departmental statements which follow. In some instances GRE scores may not be required for applicants who have completed a Master degree; however, these scores are often essential in award of financial assistance. This examination is offered several times per year in major cities of the world. For information on registration and scheduling write to the Educational Testing Service, Princeton, New Jersey 08540. In submitting test scores request that they be sent to the Dean of Graduate Studies, State University College of Forestry, Syracuse, New York 13210 (Institutional number R2530).

The College provides a special form for application for graduate work. Requests for information and applications should be addressed to the Dean of Graduate Studies, State University College of Forestry, Syracuse, New York 13210.

Under special conditions and on recommendations of the department chairman concerned, students may be admitted at the discretion of the Graduate Committee and carried on a non-degree status. Non-degree students accepted for special study programs may be regarded as visitors and normal graduate standards need not apply.

## ACADEMIC REQUIREMENTS

Graduate students are required to maintain a B average as a minimum. Students whose cumulative grade point average falls below "B" at the end of any semester are placed on probation for the following semester. A student placed on probational status must qualify for full standing by the end of that semester or be subject to dismissal from graduate study.

## INTERNATIONAL STUDENTS

Citizens of other countries with special educational objectives are accepted for graduate study in all programs. They must show satisfactory evidence that they have completed studies in their major field equivalent to those at a recognized American institution with a scholastic record equivalent to a B average in their junior and senior years. They must submit Graduate Record Examination scores as explained in the section on Admission Requirements. Also, applicants whose native language is other than English must submit scores on the Test of English as a Foreign Language (TOEFL) as an indication of their ability with the English language. This examination is offered several times per year in major cities of the world. For information on registration and scheduling write to the Educational Testing Service, Princeton, New Jersey 08540, U.S.A. In submitting test scores, request that they be sent to the Dean of Graduate Studies, State University College of Forestry, Syracuse, New York 13210. See the section on scholarships for information on tuition waivers in special cases for foreign students.

International students who have completed a Bachelor or Master's degree at an American college may be admitted as graduate students. They must apply for admission as explained in the section on Admission Requirements. In this case the requirement of TOEFL scores may be waived. Students currently enrolled in an American college must obtain permission to transfer from the U.S. Immigration and Naturalization Service district office having jurisdiction over the college in which the student is currently enrolled.

## HOUSING

The College of Forestry does not operate dormitories or student residences. These are facilities of Syracuse University. Married students are certified to the Syracuse University Married Students' Housing Office, through which the University operates rental dwelling units for families with and without children. Veterans of the Armed Forces of the United States and her allies are given priority. Married students who wish to live in University housing should write to the Director, Married Student Housing, 1528 East Colvin Street, Syracuse, New York 13210. Formal admission to graduate study is required before such requests will be granted.

## EXCHANGE OF GRADUATE STUDENTS

Formally admitted degree graduate students in any unit of the State University of New York may be authorized to take courses at the State University College of Forestry without going through the usual application and admission procedures. Such exchange students must have the necessary prerequisites for the course, or permission by the instructor, and there must be available room in the course. These matters will be decided by the Professor and Department Chairman or School Dean involved and handled through the Dean of Graduate Studies.

To be admitted as an exchange student will require a statement from the student's Department Chairman indicating the course (or courses) involved, and that the course (or courses) will be accepted toward completion of his degree requirements. Whenever feasible the student will pay appropriate tuition and fees for the course(s) at his institution. If the student has a waiver of tuition at his institution, that waiver (tuition receipt) will be recognized at the College of Forestry. This authorization will apply *only* to College of Forestry courses, not to Syracuse University courses.

## GRADUATE PROGRAMS

Graduate education may be pursued at the College in any of the departments or programs listed below. Also there are wide opportunities for interdepartmental and interdisciplinary programs since the faculty of the departments cooperate in executing research, in planning graduate programs, and in teaching courses. Interested students should review the descriptions of all programs related to their field of interest to get a clear picture of the wide range of graduate education available within the College. In addition, they should keep in mind that the great variety of course offerings at Syracuse University and the State University Upstate Medical Center are also available. Course offerings at these institutions are not listed in this catalog. This arrangement means that graduate students at the College work intimately with a distinguished faculty, in a small campus environment, and yet have all of the educational and social advantages of a large university complex at their disposal.

The descriptions which follow should be reviewed in relation to the following administrative divisions:

**School of Environmental and Resource Management**

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Department of Forestry Economics 81
Department of Forest Management 82
Department of Silviculture 83

**School of Biology, Chemistry and Ecology**

Department of Forest Botany and Pathology 84
Department of Forest Chemistry 88
Department of Forest Entomology 86
Department of Forest Zoology 87

**School of Environmental and Resource Engineering**

Department of Paper Science & Engineering 90
Department of Wood Products Engineering 91
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**School of Landscape Architecture** 93

**Interdepartmental and Major Interdisciplinary Programs**

World Forestry 96
Water Resources 97
Organic Materials Science 98
Forest Land Use and Regional Planning 99
Forest Soils 99
Chemical Ecology 99
Forest Recreation 99
Plant Physiology-Biochemistry 99

## FORESTRY ECONOMICS

Armstrong (Industry Economics, Resource and Market Analysis); Bennett (Economic Theory, Economic Thought in Forestry); Christiansen (Forest Production Economics, Economic Systems Analysis); Canham (Regional Economics); Duerr (Managerial Economics, Resource and Market Analysis); Petriceks (Macro-Economics, International Forestry Economics).

Graduate study emphasizing the economic aspects of forestry is offered by the Department in programs leading to Master and Doctor degrees. The Master's programs are designed to meet the needs of the graduate in forestry or forest products. They also serve the graduate in liberal arts, engineering or business whose interests point toward the economics of forest resource management. The aim is primarily to broaden the student's understanding of the content of forestry economics.

The Doctoral program is for those who wish to make a career as professional forestry economists in research institutions, in the academic world, or in business or government. The goals are depth of understanding and familiarity with economic tools contributory to making competent decisions in resource economics, management and policy. Requirements are in general the same as those observed in economics departments of leading universities, except that the student completes specified work in the economics of forestry.

Whatever the program, the basic purpose is to help the student acquire the tools and facility for disciplined, logical, critical and constructive thinking and for clear expression in this field.

Instruction at the College of Forestry is supplemented by the wide range of courses available in the Maxwell Graduate School of Citizenship and Public Affairs, the College of Business Administration, and other units of Syracuse University. Individual programs may include supporting courses in general economics, mathematics and statistics, operations research, business, international affairs and other social sciences and related fields. The substantial library resources, computer facilities and other resources of Syracuse University also supplement those of the College.

Graduate research within the Department covers a broad spectrum. Examples of topics recently treated are: application of economic systems and operations research in timber management and in the manufacture and marketing of forest products; forestry investments in the face of uncertainty; economic models for public forestry decision-making; history of economic thought in forestry; the financing of public recreational improvements; and forestry investment criteria in developing nations.

## FOREST MANAGEMENT

BICKFORD (Statistics, Inventory, Research Design); CUNIA (Operations Research, Mensuration); GETTY (Forest Policy, Administration, Management); GRAVES (Resources Planning, Policy, Management); HORN (Business Management, Law); KOTEN (Management, Systems Analysis); KASILE (Statistics, Experimental Design); MORRISON (Sociology of Outdoor Recreation); SHAFER, MOEHLER, ECHELBERG (Forest Recreation Research); SULLIVAN (Mensuration).

The graduate program in the Department offers wide opportunity for either specialization or breadth in advanced study. The faculty foster a spirit of individual initiative and free inquiry into all aspects of managerial concerns. Joint programs are common, aiming at strength and balance with relevant knowledge offered in other departments and disciplines. Graduates from various fields of study are encouraged to apply. The major areas of concentration outlined below permit a student to prepare himself in considerable depth, but flexibility, integration, and broader understanding are encouraged.

A *Management* program prepares graduates for the field of administration or management in a public agency or a business concerned with natural resources or environmental quality at the executive, planning, budgeting, programming, operating, or leadership levels. The wide choices of courses in other departments of the College and in the many Colleges of Syracuse University, including the renowned Maxwell Graduate School of Citizenship and Public Affairs and the College of Business Administration, are used to supplement the Department's offerings. This enables the student to earn a Master's degree which is the forestry or natural resources equivalent of a Master of Business Administration or Master of Public Administration degree. The Ph.D. program is scientifically oriented and strongly supported by courses in the behavioral sciences to develop the talents needed in top executive leadership in the rapidly developing fields of man-resources relationships, environmental quality, and management sciences. Interested graduates from business and other colleges are encouraged.

Forest *Mensuration* and *Biometrics* is a more concentrated program that offers highly sophisticated courses in mensuration and operations research, as well as all phases of statistics and statistical design, leading to the Master and Doctor degrees. The course work and research, directed by internationally known specialists in forest mensuration and statistics, constitute an exceptionally strong program.

Forest *Recreation* is a major program of graduate study and research offered by the Forest Management Department. Either specialized inquiry or complex synthesis and insight may be pursued, for which elective support may be drawn from other departments such as Landscape Architecture, Economics, Silviculture, and Zoology. Syracuse University courses in sociology, psychology, philosophy, journalism, physical education and related fields offer strong support for the student preparing seriously for Recreation. Of special significance is the Recreation Research Branch of the Northeastern Forest Experiment Station of the U.S. Forest Service located at the College of Forestry. Its Director and several professional recreation researchers in residence at the College serve as adjunct faculty in the Forest Management Department. Both Master and Ph.D. candidates are presently matriculated in this program. There is great employment opportunity for many more people with advanced degrees in this field. Interested graduates with a Bachelor of Science degree in rural sociology, psychology, urban planning, political science, business or public administration qualify for this program by including sufficient forestry study in their graduate program to provide a natural-resources background.

## SILVICULTURE

BERGLUND (Silvics); BLACK (Watershed Management); CRAUL (Forest Soil Physics); ESCHNER (Forest Influences); FARNSWORTH (Silviculture); HERRINGTON (Meteorology); JOHNSON (Silviculture); LEA (Director, Summer Field Session, and Silviculture); LEAF (Forest Soils Fertility); LEONARD (Watershed Management); MINKLER (Hardwood Silviculture); RICHARDS (Reforestation).

Concern for the forest ecosystem provides a major focus for the work of the Department. Translation of these concerns to broader questions of environmental quality is given attention. Well-equipped laboratories, specialized equipment and greenhouse facilities are available to graduate students.

Graduate study in all aspects of silviculture and its supporting sciences is available. Emphasis can be placed on fundamental biological relationships or on applications of these relationships in the forest environment. Programs are coordinated with other areas of specialization through cooperation between the Department, other departments of the College, Syracuse University, and the U.S. Forest Service Research Unit. A major strength is the close association of scientists representing a broad spectrum of specialists, stimulating intra- and interdisciplinary cooperation.

Graduate emphasis may be directed to silvics, silviculture, forest stand development, forest influences and watershed management, forest tree genetics and tree improvement, forest meteorology and climatology, forest soil physics and forest soil fertility-nutrition, and site relations.

Extensive College forests of nearly 25,000 acres include most forest types of the northeast, as well as plantations, seed orchards, and a tree nursery, all of which offer exceptional opportunities for field study under a wide variety of environments. Major field installations include long-term northern hardwood

stand improvement studies, the oldest continuously studied forest fertilization trials in the United States, and two large micro-climatic tower complexes with associated automated data acquisition systems and instrumentation.

## FOREST BOTANY AND PATHOLOGY

TEPPER, *Chairman* (Anatomy and Morphogenesis); GEIS (Ecology); GRIFFIN (Mycology and Fungus Physiology); KETCHLEDGE (Ecology and Bryology); LOWE (Mycology); MANION (Pathology); McDOWELL (Fungus Physiology); SCHAEDLE (Physiology); SILVERBORG (Pathology); VALENTINE (Genetics); WANG (Mycology); WILCOX (Physiology of Growth and Development); ZABEL (Wood Deterioration).

The program in botany and pathology is designed to provide students with a course of instruction in basic botanical and related natural and physical sciences. Research and thesis problems are generally designed to utilize forest organisms in the development of biological knowledge. Graduate programs are offered in the fields of anatomy, morphogenesis, physiology-biochemistry, ecology, forest pathology, wood deterioration, mycology, genetics and taxonomy. Strong supporting courses in climatology, meteorology, soils, ecology, bacteriology, botany, microbiology, genetics, mathematics, chemistry and statistics, available in other departments at the College and at Syracuse University, provide additional courses for graduate programs.

Current areas of active research by departmental faculty are: *Anatomy and morphogenesis,* factors that influence the development and form of root systems and regulate the development of root and shoot apices, cell differentiation in tissue culture; *physiology,* chemical regulation of organ growth, the nature and physiology of mycorrhizae, ion transport, mineral nutrition, biochemical aspects of cambial physiology, photosynthesis; *ecology,* dynamics of plant communities in the Adirondack Mountain Region and on the Alleghany Plateau, the influence of man on plant communities, the interaction of environmental factors during vegetational change, phytogeography and chemical ecology; *forest pathology,* diseases of forest plantations, heart-rots and cankers, tree rusts and physiogenic diseases; *wood deterioration,* the effects of stains and decays on wood use and their controls, the chemistry of wood decay, toxicity mechanisms, and the bioassay of toxicants; *mycology,* the taxonomy, sexuality, and morphology principally of wood-inhabiting fungi and microfungi; *fungus physiology,* the role of nucleic acids and intermediary metabolism in growth and morphogenesis; *genetics,* quantitative and population genetics, the heritability and natural variations in wood characteristics that are important in forest products and wood pulp; *taxonomy,* the identification, nomenclature and classification principally of fungi, bryophytes and vascular plants.

Illick Hall, the new biological science building, provides faculty and students with modern facilities for botanical research. Special facilities include roof-top greenhouses; growth chambers; herbaria and special research laboratories for tissue culture, microchemistry, microtechnique, microscopy, radiochemistry, chromatography, and computation. In addition a cobalt-60 source, electron microscopy laboratory and a computer center are available at the College for student use. Extensive College forests, including most forest types of the Northeast, plantations and nurseries offer exceptional opportunities for field study of forest plants and diseases.

Research in the department is supported by private industry, the United States Forest Service, the Department of Environmental Conservation, the Research Foundation of the State of New York, a variety of Federal agencies and by the State. In addition to direct project support, the grantees also provide for graduate research assistantships.

## FOREST ENTOMOLOGY

SIMEONE, *Chairman* (Ecology and Wood-Inhabiting Insects); ALLEN (Ecology and Population Dynamics); BREZNER (Physiology); KURCZEWSKI (Morphology, Taxonomy, Behavior); LANIER (Ecology, Cytotaxonomy); NAKATSUGAWA (Toxicology).

Broad opportunities for study in forest entomology are available for the graduate student who, with the advice of his major professor, is permitted to follow a program of research supplemented by appropriate course work at this College and at Syracuse University. On-going research includes not only classical studies on the biology of forest insects and those causing the deterioration of wood, but a wide variety of possibilities such as host-parasite relationships, host selectivity, insect physiology, dehydrogenases, mechanisms and enzymology of insecticide detoxification, biochemical systematics, comparative behavior, insect communications, taxonomy, histology and cytology. Selected problems may also concern chemical, biological, and silvicultural aspects of insect control.

Informal interdisciplinary pursuits are possible in chemical ecology, genetics, forest pathology, immunology and climatology involving other departments at this College and Syracuse University. Areas of specialization are enhanced by supporting courses in these other disciplines. Students interested in insect ecology, chemical ecology, physiology or taxonomy, for example, may pursue these subjects relative to plants and other animals by selecting courses in forest botany, silviculture, forest zoology and biochemistry.

Students and faculty have a wide range of field and laboratory facilities available for research. The several forest properties represent varied forest environments while Illick Hall provides modern controlled facilities and instrumentation. More than 18,000 square feet of indoor space is available, with access to electron microscopy laboratory, environmental chambers, ultra centrifuges, nuclear magnetic resonance equipment, gas chromatograph, isotope laboratory, cobalt source for irradiation, a sound-proof room, glasshouse, and an insectary complex affording subjection of insects to controlled as well as ambient weather conditions. The taxonomic museum houses nearly 100,000 insects species deposited by entomologists for more than half a century. A computer center provides services in all phases of entomological research.

## FOREST ZOOLOGY

ALEXANDER, *Chairman* (Vertebrate Ecology); BEHREND (Forest Wildlife Biology and Management); BROCKE (Bioenergetics and Wildlife Biology); CHAMBERS (Wildlife Biology and Management); DINDAL (Invertebrate Ecology); GRAVES (Vertebrate Physiology); HARTENSTEIN (Invertebrate Physiology); PAYNE (Wildlife Conservation); PRICE (Animal Behavior); VAN DRUFF (Vertebrate Zoology and Wildlife Biology); WEBB (Vertebrate Ecology and Forest Wildlife Management); WERNER (Limnology and Aquatic Biology).

Graduate studies in forest zoology include both basic and applied research on animals of the forest ecosystem, including its associated soils, water and related wildlife areas. Programs are offered in vertebrate ecology, soil invertebrate ecology, endocrinology and physiology, population ecology, animal behavior, forest wildlife biology, aquatic ecology, and forest wildlife management.

The Department and its laboratory facilities are located in a new biological sciences building. They include specialized laboratories for research in physiology, soil invertebrate ecology, animal behavior, aquatic biology and wildlife biology. An extensive collection of invertebrates is available, as well as the large Roosevelt Wildlife Collection. Various temperature-humidity chambers are available, including an environmental simulating chamber which programs and records light, temperature, humidity, altitude, wind, and precipitation.

The Department has an intensive research program in wildlife biology, open to graduate students on the Archer and Anna Huntington Wildlife Forest, a 15,000-acre forest in the Central Adirondack Mountain region. Many forest types are present in varying stages of management. Four faculty members are year-round residents on the area. A new laboratory building is available.

Field research can also be conducted on the College's Heiberg Memorial Forest and Experiment Station. Several other areas are located within a 35-mile radius of Syracuse, and frequently are used for research purposes. These include Onondaga County's Highland Forest; the State Conservation Department's game management areas—Tioughnioga, Three Rivers, Howland Island, and Cicero; the Montezuma National Wildlife Refuge; and privately-owned lands.

These facilities and areas are supplemented by the services and facilities of the College's other departments, particularly the Departments of Forest Botany and Pathology and Forest Entomology. The Departments of Forest Management and Silviculture provide support in relating the managerial and silvicultural facets of forest resources to wildlife biology study programs. The College is adjacent to Syracuse University with its large Department of Biology, strong in physiology and developmental zoology. Available through this institution are programs in social sciences and engineering, including land use and environmental pollution.

The State University Upstate Medical Center also is nearby. Its facilities are available for graduate students whose research can be benefited by their specialized library, equipment, and faculty.

Examples of recent research include the ecology of forest wildlife species, movements of larval fish, domestication of Norway rats and pheasants, marsh ecology, hematology of woodchucks and game birds, wetland planning, nesting behavior, deer behavior, physiology of isopods, pesticides and soil fauna, physiology of hibernation, and the population dynamics of wild animals.

## FOREST CHEMISTRY (POLYMERS, NATURAL PRODUCTS, BIOCHEMISTRY)

SCHUERCH, *Chairman* (Wood and Polymer Chemistry); BAUM (Biochemistry and Microbiology); JAHN (Forest and Wood Chemistry); LA LONDE (Organic and Natural Products Chemistry); SARKO (Physical and Polymer Chemistry); SILVERSTEIN (Ecological Chemistry); SMID (Physical and Polymer Chemistry); SMITH (Physical and Polymer Chemistry); SONDHEIMER (Biochemistry); SZWARC (Physical and Polymer Chemistry); TIMELL (Carbohydrate and Wood Chemistry); WALTON (Biochemistry).

Recent years have seen profound advances in the fundamental knowledge of chemical areas which have special significance to forestry. Therefore, this department is very active in the following research areas: polymer chemistry and physics, wood chemistry, biochemistry, chemistry of natural products including ecological chemistry, and organic material sciences. (See also Interdisciplinary Program in Organic Materials Science.)

Requirements for a Master of Science or Doctor of Philosophy degree in chemistry include a research project and thesis, along with an appropriate program of courses at the College and at Syracuse University. Generous financial support is available in the form of fellowships, teaching assistantships, and tuition waivers to qualified foreign students and to postdoctorates.

Specific projects may vary from year to year, since they reflect the current interests of the department members. Current research projects with physicochemical emphasis are: the chemistry, physics, solid state and solution properties of natural and synthetic polymers, including studies in thermodynamics, statistical mechanics, crystallization, morphology, elasticity, conformation of macromolecules, optical properties, polymer catalysis, mechanism of polymerizations, polyelectrolytes, ion binding to macromolecules and ion pairing; chemistry of free radicals, radical ions and charge transfer processes; structure and properties of ionic solutions in non aqueous media; crystal structure and morphology of cell wall constituents. Current organic chemistry programs deal with synthesis of special polymers such as high temperature aromatic block, stereoregular vinyl polymers, and polysaccharides, various aspects of natural products chemistry but especially alkaloids, isolation and characterization of insect and mammalian attractants, and the chemistry of compounds having strained bonds. An active program on the structure of the polymeric wood components, hemicelluloses, lignins and celluloses is underway. In biochemistry, department members are studying mechanisms of action of plant growth hormones, biochemical regulation of seed germination, and plant enzymology.

Graduate research laboratories in the Hugh P. Baker Laboratory are well equipped for polymer studies, chemical and biochemical research. Instrumentation includes analytical and preparative ultracentrifuges, Warburg respirometer, recording infrared and ultraviolet spectrophotometers, mass spectrometer, differential refractometer, electron spin resonance spectrometer, nuclear magnetic resonance spectrometer with spin decoupler, recording polarimeter and optical rotatory dispersion spectrometer, electron microscope, X-ray diffraction, chromatography and cold laboratories, and radiochemical laboratories with counters for solids, liquids and gases.

## PAPER SCIENCE AND ENGINEERING

O'NEIL, *Chairman* (Pulping, Bleaching and Paper Properties); GORBATSEVICH (Pulping, Bleaching, Paper Technology, and Paper Properties); STENUF (Chemical Engineering, Instrumentation, Thermodynamics, Process Control, Metallurgy and Corrosion); STRAUSS (Paper Properties, Paper Coating, Pulping, and Bleaching).

The pulp and paper industry is one of the most rapid in rate of growth among all major American industries and is fifth largest in the nation. The need for professional men with advanced education in science, engineering and technology is increasing at a rate more rapid than the growth of the industry. The College pioneered in providing graduate study in this area in 1920 with the organization of the Department of Paper Science and Engineering.

Since its inception, the Department has maintained a singularly high position in professional education in providing personnel for the continuing development of the pulp, paper, and allied industries. Its graduates, who are in constant demand, are located throughout the world.

The graduate program reflects the strong trend toward diversification in the industry and offers opportunities for obtaining Master of Science and Doctor of Philosophy degrees in a variety of subjects related to the manufacture of pulp and paper. Advanced courses are offered in such diverse areas as engineering, physical and organic chemistry, polymer chemistry, paper physics, and fiber morphology, as well as specific areas of pulping and paper properties.

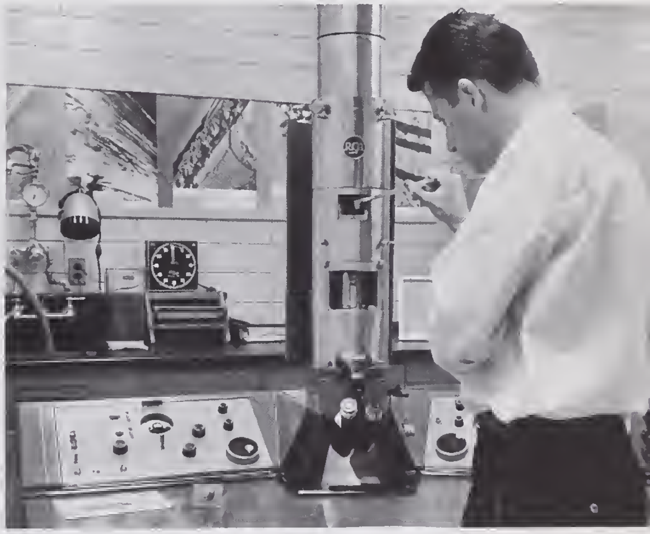
Major research areas in the Department are: chemistry of pulping and bleaching; physical properties of fibers; characteristics of the paper web; chemical engineering operations as related to the pulping and papermaking processes; utilization of new raw materials; flow properties of papermaking materials.

Walters Hall, opened in 1969, is devoted exclusively to education and research in this field. It contains a large number of research and special purpose laboratories which house sophisticated equipment. This new facility will enhance the existing graduate program.

The research program is designed to generate new information regarding the fundamentals, the science, the engineering and the technology of the papermaking process as a contribution towards progress and the future development of the industry. These efforts are made possible by the use of advanced techniques such as electron microscopy, specialized spectrophotometry, nuclear magnetic and electron spin resonance and nuclear tracer techniques, all within the framework of one of the outstanding research facilities in the field. Also included is a modern clinical engineering laboratory designed for studies in all phases of unit operations, processes, process control and thermodynamics.

The Department maintains an experimental pulp and paper mill equipped with machinery and instrumentation for studies in many facets relating to this industry. These studies include pulping, pulp purification, reuse of secondary fibers refining, investigations of paper additives, and papermaking. This facility includes a paper machine, a 400 horsepower double disk refiner, a two-pocket grinder for mechanical pulping and auxiliary equipment.

Recent research has been directed to fundamental studies of pulping, bleaching, additives, recovery of secondary fibers, the papermaking process, reactions of wood components during mechanical and chemical treatments, evaporation, fluid dynamics, heat transfer, the structure of wood and wood fibers, and chemical and fiber recovery.



## WOOD PRODUCTS ENGINEERING

DAVIDSON, *Chairman* (Organic Materials Science); ANDERSON (Wood Quality-Growth Relations); Côté (Cellular Ultrastructure); DE ZEEUW (Wood Anatomy, Structure-Property Relations); MEYER (Wood-Polymer Systems, Radio Isotope Techniques); MOORE (Bonded Materials Technology); PENTONEY (Mechanical Behavior, and Fracture Mechanics); SIAU (Protective Treatments, Transport Processes); SKAAR (Wood Physics); G. SMITH (Materials Marketing); WHITT (Industrial Engineering).

Graduate study is in wood science, wood technology, production systems engineering in the wood products industries, and wood products distribution.

The principal objectives are to develop originality and the analytical approach to problem solving. The student may emphasize appropriate phases, including the mechanical properties of wood, structure and anatomy of wood, cellular ultrastructure, quality of wood, processing of wood into various forms and products, industrial management and production systems engineering of wood manufacturing plants, distribution of wood products, organic materials science, physical chemistry of wood treatments, fluid treatments and wood physics.

Research problems are selected after faculty-student consultation. Typical problem areas include variations in wood structure caused by ecological factors; ultrastructure of cell walls; preservative treatments for insect, fire, and decay resistance; protective or esthetic coatings; machining variables; bonded materials technology; mechanical and physical properties of wood and structure-property interaction of polymeric materials; composite material properties and design; chemical enhancement of wood; problems of the distribution enterprise for lumber and manufactured products and production engineering in wood products manufacture.

Modern laboratories and instrumentation are available for advanced research. There is a close liaison with specialists in other disciplines concerned with wood research so that interdisciplinary approaches to problems are possible. Syracuse University course offerings, especially in the College of Engineering, are available to supplement those of the College in planning graduate study programs.

Undergraduate backgrounds required for the diversified programs in the Department depend upon the student's interests in his graduate study. He may have majored in the Natural Sciences, Forestry, Wood Science, Wood Technology, Engineering, or certain of the social sciences, such as Economics or Business Administration. Programs of graduate study in Wood Products Engineering may be built on any of these foundations.

Special study and research opportunities exist in the wood-using industries. Close cooperation is maintained with these industries by the College. The large volume and variety of wood products processed within New York State creates a favorable climate for graduate study in this field.

## FOREST ENGINEERING

TULLY, *Acting Chairman* (Structural Design, Hydrology, Soil Mechanics); BENDER (Geodesy, Remote Sensing); BROCK (Analytical and Interpretive Photogrammetry); HAWKINS (Hydrology); LEE (Systems Analysis, Computer Science); PALMER (Industrial Engineering); STANTON (Photogrammetry).

The *Forest Engineering* program in the Department is articulated closely with course offerings of the Civil Engineering Department and the Industrial Engineering Department of Syracuse University. This Master's program offers a unique opportunity for graduates with a Bachelor of Science degree in Forestry to obtain advanced preparation in the engineering components of resources management, and environment management based on the fundamentals of civil and industrial engineering, systems analysis, computer science, and management science. The diverse resources of other Schools and Departments of the College provide specialized emphasis to this graduate program where appropriate.

The *Photogrammetry* program is an individually designed Master or Doctor program in Analytical Photogrammetry, Photogrammetric Systems, Photo Interpretation and Remote Sensing. Graduates with Bachelor of Science degrees in forestry or in engineering, geology, physics, or mathematics qualify for graduate study in Photogrammetry.

Although the *Forest Engineering* and *Photogrammetry* programs have been well established for several years, the Department of Forest Engineering is newly established, and graduate degrees earned under these programs are still under the administrative overview of the Forest Management Department.

## SCHOOL OF LANDSCAPE ARCHITECTURE

SEARS, *Dean* (Natural Area Studies); EARLE (Art, History of Environmental Development); VIERTEL (Plant Materials, Computer Graphics); REIMANN (Methods and Philosophy of Design).

The School of Landscape Architecture is unique in its location in a College of Forestry, whose campus is immediately adjacent to Syracuse University. This provides for a strong base in ecology, the natural sciences, resources management, recreation, and for development of a diversity of landscape architectural programs interrelated with architecture, planning, urban studies, and the social and behavioral sciences.

Students with undergraduate degrees in landscape architecture may choose to further develop skills in the landscape design process and apply them to the study of more complex environmental problems or to areas of special interest. They may also choose to focus mainly on parametal areas of interest such as identified above, with a view toward expanding their background in environmental concerns. Those whose undergraduate work has been in other areas are invited to focus directly on landscape architectural studies or to develop potential relationships between their prior disciplines and the profession of landscape architecture.

Consistent with the wide-ranging environmental philosophy of the School, graduate programs are developed to enhance each student's background, capability, and intentions. The general format is not highly structured but more individually oriented in three broad areas. These include course work in landscape architectural studies; in areas designated as directly pertinent to a particular program intention; and in elective areas to serve more general and widespread educational interests. Students with undergraduate backgrounds not in landscape architecture, architecture, or other design oriented programs usually will devote two or three semesters developing graphic skills, design capabilities and other basic disciplines in preparation for the Master of Landscape Architecture program.

Research at the School, both sponsored and independent, centers on man-environmental relationships, particularly those of a current, critical nature. Graduate programs also usually include some investigative research in one of these areas, culminating in the preparation of a thesis.

The combination of the College library and the several libraries on the University campus offer excellent in-depth reference material to support study programs. Facilities at the School are extensive and include drafting, reproduction, model making, recording, photographic and projection equipment. The College maintains a computer center which is used primarily for instruction and research and is available for individual use by graduate students.

The curriculum of the School includes a semester of study in a foreign location as a regular part of its undergraduate program. The location for this semester of study varies at two- to three-year intervals and is conducted in conjunction with the State University Office of International Studies and World Affairs. Graduate students are encouraged to fully utilize this unique feature as a resource for advanced study in particular environments or in studies of cultural and environmental relationships.

Outstanding professionals periodically visit the School to discuss their special interests and to serve as critics and lecturers to the various programs. In addition, the School, through its faculty and alumni, maintains contact with a great many landscape architectural firms, planning agencies, park systems, and governmental organizations throughout the country.

The Syracuse area has the largest concentration of landscape architectural firms in the State, outside of New York City. With a metropolitan population of nearly three quarters of a million, the city has many progressive, urban-oriented studies and projects in process. Also, its central location is most favorable for access to other urban areas. New York State, with its large population base, has a rich variety of recreation areas administered by diverse governmental agencies and private owners. These vary from vest pocket parks in urban areas to the 2 million-acre Adirondack Preserve, and thus offer an ideal opportunity for study and research at many levels.

The profession of landscape architecture is experiencing its most rapid expansion in history. Its scope is increasing geometrically as man's concern for his environment grows. The opportunity to use additional training to better understand and satisfy the changing relationships of man and his environment and to fill a desperate need for landscape architects in education, in private practice, and in public service promises a rewarding career.

Applicants who have an undergraduate degree in a design or art oriented program are required to submit a portfolio of their work as a part of their application materials. Portfolios will be returned.

## INTERDEPARTMENTAL AND MAJOR INTERDISCIPLINARY PROGRAMS

Interdisciplinary graduate study programs at the College are both of an informal and formal nature.

Informal programs are of long tradition and permit students to select thesis topics and develop programs from a broad spectrum of professional and science topics in forestry, forest products, the physical and biological sciences, engineering, and landscape architecture involving the supporting resources of several departments. These informal interdisciplinary programs are achieved readily through flexible degree requirements and the assignment of thesis committee members representing the key supporting areas.

Other programs suggestive of the range of topics available to students in the informal interdisciplinary approach are subjects involving the biological sciences and biochemistry; paper science, engineering, and plastics; wood products engineering, wood science, and polymer chemistry; silviculture and the botanical sciences; tree improvement and genetics; and wildlife biology and resources management. Though considerable breadth and flexibility are achieved in these informal interdisciplinary graduate study programs, students are still required to meet in full the degree requirements of their major department.

Formal interdisciplinary programs leading to Master and Doctor of Philosophy degrees are available in the areas of *World Forestry, Water Resources,* and *Organic Materials Sciences.* These three programs are designed to permit greater supporting subject breadth and topic focus than is available in the departmentally based informal interdisciplinary programs. These formal interdisciplinary programs are described below:

### *World Forestry*

Program Leader—Charles C. Larson, Professor of World Forestry, Director of the Office of International Forestry, and Dean of the School of Environmental and Resources Management.

Graduate study and related research in world forestry is a College-wide activity supported by faculty representing the major areas of professional faculty specialization and broad backgrounds of foreign forestry experience. The non-technical elements of the program are supported by a wide variety of course offerings in the Maxwell Graduate School of Citizenship and Public Affairs, the Department of Geography and other departments of Syracuse University. Opportunities for field training and research in tropical forestry and related fields are available to qualified participants in this program, under cooperative agreements maintained by the College with the University of the Andes, at Merida, Venezuela, and the Institute of Tropical Forestry of the U.S. Forest Service, at Rio Piedras, Puerto Rico. The College also participates in the program of the Organization for Tropical Studies which provides opportunities for advanced study and research in tropical forestry and related fields for selected graduate students.

Graduate study in this field is aimed at supplementing and enriching the student's technical forestry knowledge and providing the broad background deemed necessary for effective service in foreign forestry. This includes service as forestry advisor, teacher and research specialist with national and international agencies, private business and industrial firms, philanthropic foundations and voluntary service organizations whose activities include the development and/or use of forest resources in other lands.

At the Master's level, program emphasis is on the attainment of general competence in foreign language, cultural anthropology, world geography, history, and international affairs, plus a broad understanding of the world forestry situation. While the candidate is urged to devote major effort to formal course work, a thesis is required to provide a creative experience in critical study and original thinking. Sufficient flexibility is maintained to enable the student to focus his studies on some aspect of world forestry either global, regional or national in scope.

At the doctoral level, program concentration is on a specialized discipline area such as forest botany, forestry economics, forest management, silviculture, or wood products engineering. Orientation to the world forestry field in this case is achieved in part through the selection of formal course work, and in part through providing an opportunity for the student to conduct his thesis research in residence abroad. Major program emphasis is placed on a thesis representing a significant contribution in original study in a world forestry problem area.

### *Water Resources*

Program Leader—C. E. Farnsworth, Professor, Department of Silviculture.

The College is concerned broadly with biological and managerial relationships of forest resources, and the productive uses and benefits of forest products and services. The College has particular interests in the ecological and biological relationships having to do with the management and utilization of water resources; with problems of water quality, quantity, and availability as these are related to land use and development activities; and with the special problems of the forest industries which utilize water in manufacturing processes or produce by-products which affect water quality. The rehabilitation, protection and improvement of watersheds is an important corollary area of interest.

Graduate study programs in water resources may be arranged on an informal basis within several departments of the College. Such departmental programs are usually organized within the Departments of Forestry Economics, Forest Management and Engineering, Silviculture, Landscape Architecture, Forest Zoology, Forest Entomology, Forest Chemistry, or Paper Science and Engineering and often involve support from several Colleges of Syracuse University.

The formal Interdisciplinary Program in Water Resources was organized in 1968 to supplement departmental programs by providing a sound basis for graduate academic programs designed to emphasize the multidisciplinary aspects of water resources. This effort recognized that water relationships are important in almost every aspect of human concern and merit attention as integrative and central elements rather than accessories. The Water Resources Program makes available to graduate students pertinent resources of the College and of Syracuse University, and where appropriate, those of other units of the State University.

The program is not structured in terms of required courses or content. Attention is given to the particular objectives of each student who enrolls in the program. Within the framework of the general graduate study requirements of the College, courses, problems and seminars are selected to attain the specific objectives and special interests sought by the student. The academic competence required is demanding. The programs arranged are broadly integrative rather than concentrated in a discipline. Critical review of the program proposed for each student is made by an assigned program committee to ensure that institutional standards are maintained and program objectives are met.

A major professor is assigned by the Program Leader to accept primary responsibility for the program of each student. Two additional faculty members in areas of expected academic or research emphasis are also selected. These three faculty members constitute the academic program committee for the student. The student is required to submit a formal report to the program committee consisting of a detailed work plan describing and defending his academic and research objectives and a schedule of courses and other elements of his contemplated study. This report is reviewed by the program committee, and is made a part of his permanent file. It is reviewed and updated at the beginning of each semester. The program committee will also serve as the thesis committee.

### *Organic Materials Science*

Program Leader—KENNETH J. SMITH, JR., Associate Professor, Department of Forest Chemistry, and Research Associate and Assistant Director, State University Polymer Research Center.

Organic Materials Science is that segment of the natural sciences that deals with structure-property relationships in organic materials. The College of Forestry has long been involved in various aspects of Organic Materials Science through programs in the sciences of paper, polymers and wood. An understanding of the behavior of materials in general has developed rapidly in recent years and it is now clear that many of the fundamental concepts of material properties are applicable to both natural and synthetic polymers. This thinking has led to establishment of the new interdisciplinary program in Organic Materials Science. This program involves the Departments of Forest Chemistry, Paper Science and Engineering, and Wood Products Engineering, the Empire State Research Institute, the Cellulose Research Institute, and the State University Polymer Research Center.

Organic Materials Science strives to instill in the student a broader perspective than is normally achieved in standard academic programs. This is accomplished by uniting the students' immediate research interests to larger goals involving several disciplines. In this manner a generalization of interest is acquired without sacrificing scientific rigor and depth of knowledge in more restrictive areas. Materials of current research activity include films, fibers, elastomers, composites, antithrombogenic materials, membranes, polyelectrolytes, polysalts, fiber assemblies, wood, paper, and wood-polymer systems, and involve studies in thermodynamics, statistical mechanics, chain conformations, crystallization, crystal morphology, x-ray, light scattering, polymerization, polymer reactions, wood and paper physics, elasticity, contractility, heat and mass transport, and paper properties. See also the sections of the participating departments and institutes.

Graduate programs in Organic Materials Science are available at both the master and the doctoral level. Because of the breadth of the field it is expected that most students work for the doctoral degree. Programs consist of course work and research. Course work requirement is tailored to build upon the individual student's undergraduate background and experience. Entering students are expected to have a Bachelor's degree in Chemistry, Physics, Engineering, Polymer Science, Wood and Paper Science. The course work portion of the Organic Materials Science program will be directed toward background preparation in solid state and polymer science. Near the end of the student's course work program he will be exposed to the modern concepts of the structure-property relationships that are of importance in organic materials. Research topics will be selected to permit the student to explore in depth an aspect of organic materials in which he has a particular interest.

Students registering in the Organic Materials Science program satisfy all college-wide requirements for advanced degrees. Each student will be assigned a major professor and a faculty committee who will help him plan his course work program and who will serve as consultants on his research project. Courses will be selected from those offered, both at the College of Forestry and the Colleges of Engineering and Liberal Arts at Syracuse University. The research work will be carried out in College of Forestry laboratories which are particularly well equipped for materials science studies.

### Forest Land Use and Regional Planning

Interdepartmental graduate programs involving the Department of Forest Management, the School of Landscape Architecture, and the Department of Forestry Economics. See these departmental and School statements for further information.

### Forest Soils

Interdepartmental graduate programs involving the Departments of Silviculture, Forest Management, Forest Botany and Pathology, Forest Entomology, Forest Zoology, and Forest Chemistry. See these departmental statements for further information.

### Chemical Ecology

Interdepartmental graduate programs involving the Departments of Forest Chemistry, Forest Botany and Pathology, Forest Entomology and Forest Zoology. See these departmental statements for further information.

### Forest Recreation

Interdepartmental graduate programs involving the Departments of Forest Management, Forestry Economics, and the School of Landscape Architecture. See these departmental and School statements for further information.

### Plant Physiology—Biochemistry

Interdepartmental graduate programs involving the Departments of Forest Botany and Pathology and Forest Chemistry. See these departmental statements for further information.

## VIII

## CONTINUING EDUCATION

The philosophy that education is a lifelong pursuit is an ancient one, and was written into the law creating the College of Forestry. This concept is doubly important to the sciences and professions in this technological age, when new knowledge is bursting in all directions. Hence, the College has, over the years, succeeded in communicating knowledge on forest resources management, utilization and conservation to a wide variety of off-campus publics. The entire College faculty has contributed to these programs.

Conferences, symposia, seminars and short courses on various aspects of forestry and the related sciences are conducted at both the basic and applied levels. Audiences include forest owners, managers, and operators; wood engineers and forest industries personnel; academic and scientific groups, conservation and recreation personnel from local, and state agencies, and other public and private planning groups and citizen-action committees. General and technical publications, a specialized film library, series of radio programs, a speakers' bureau, and a limited number of special programs on commercial television are the primary mass media employed.

The College recognizes that the informational needs of New York's citizens are undergoing change. Some of the factors now affecting the continuing education program are: the abandonment of farmland and the increasing urban character of the population, the changing pattern of ownership of forestland, the rise in level of education and sophistication in a more affluent society, the dynamics of technological change, and the increase in leisure time, greater mobility in travel, and outdoor recreation.

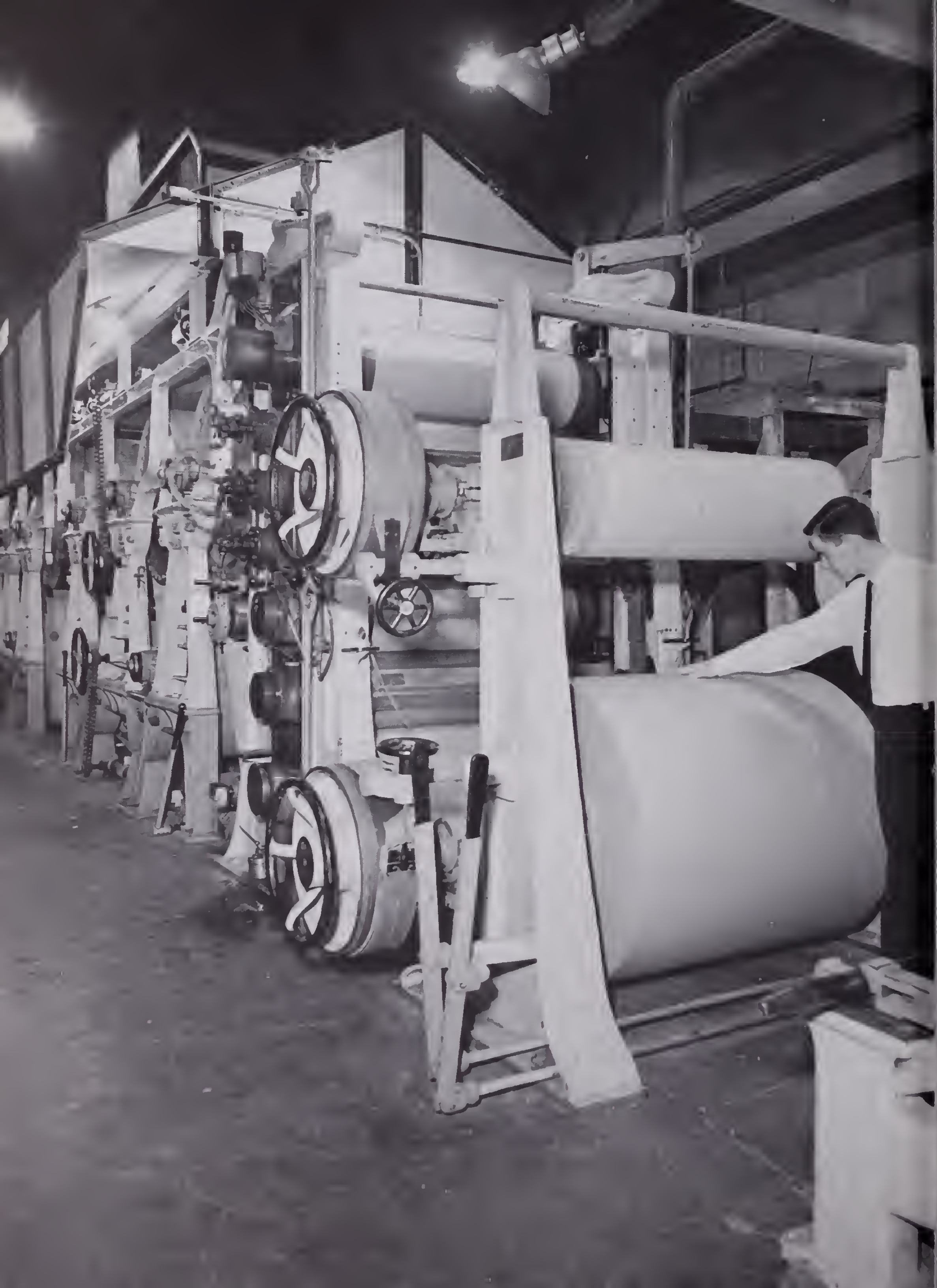
In looking to the future, the College is aware of society's increasing interest and concern with natural resources, the quality of man's environment, the near crisis in water resources, and the need for greater outdoor recreation opportunities. This trend has been called "a growing resource ethic"—an awareness of the obvious and subtle relationships between man and his natural environment, and a desire to enhance them.

The College, accordingly, has recently reorganized its internal structure to provide even greater opportunity for instruction, research and public education directed towards environmental concepts and issues. Furthermore, a number of changes have been made in the curricula of the four schools within the College which, in turn, permit considerably greater emphasis on environmental courses as part of the continuing education offerings of the College.

These developments come at a time when accelerating technological obsolescence is an acknowledged phenomenon in all spheres of knowledge, including forestry. Continuing education programs play a vital role in closing the gap between new knowledge and the educational needs of practicing foresters, resource scientists, engineers and teachers, industrial and civic leaders, and the general public.

Expansion of 'in-service' training courses, establishment of 'environmental learning centers' on College forest properties and production of media materials for public information and education are examples of activities directed towards updating and upgrading professional clients and broadening the public's awareness and appreciation of New York's forestlands and other natural resources.

For information on specific continuing education projects, inquiries should be sent to: Dean, Public Service, Continuing Education and Educational Communications, State University College of Forestry, Syracuse, N. Y. 13210.



# IX

# COURSE OFFERINGS

The academic resources of three institutions—the State University College of Forestry, Syracuse University, and the State University Upstate Medical Center—are available to undergraduates and graduate students in developing their study programs at the College.

In addition to the many professional and basic science courses offered by the College, a wide range of offerings are taken either as required courses or are available as electives at adjacent Syracuse University. The required courses are in certain subject areas of chemistry, engineering, physics, mathematics, geology, English, business law, personnel relations, and public address. The elective courses include most academic offerings of Syracuse University and representative subject areas are the humanities, social sciences, life sciences, physical sciences, engineering, mathematics, and the arts. Descriptions of Syracuse University courses are not included in the following College of Forestry courses.

In graduate programs at the College, Syracuse University courses are used extensively in the fields of mathematics, physics, chemistry, biology, engineering, economics, business, and citizenship. The State University Upstate Medical Center has courses available for graduate programs in the areas of anatomy, biochemistry, cytology, microbiology, and physiology.

## DESCRIPTION OF COLLEGE OF FORESTRY COURSES

The courses offered by the College are grouped by general subject areas, and the number of credit hours appears after the course title. A credit hour means one recitation (or lecture) hour per week. Three laboratory hours are equivalent to one lecture hour.

COURSE NUMBERING SYSTEM (Effective September, 1968)

I. Code Levels:

| | |
|---|---|
| 000–099 | Non-credit courses |
| 100–199 | Freshman courses |
| 200–299 | Sophomore courses |
| 300–499 | Junior & senior courses |
| 500–599 | Junior & senior courses which may be accepted for graduate credit at the discretion of the graduate student's major advisor, usually with the requirement of additional work to be performed. |
| 600–699 | Graduate courses designed primarily for the beginning graduate students but available for credit to all graduates. |
| 700–899 | Advanced graduate courses designed primarily for second and third year graduates and beyond, but available to all graduates. |
| 900–999 | Special graduate courses available only to doctoral students. |

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## APPLIED MATHEMATICS

### 360. INTRODUCTION TO COMPUTER PROGRAMMING

*3 credit hours*

The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages or problem solving. The course will cover instruction in Fortran IV, and an Assembly language plus some discussion of PL/1, Algol, APL, and use of software operating systems. This course or a demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall & Spring. Mr. C. N. Lee & Staff.

### 560. INFORMATION PROCESSING FUNDAMENTALS

*3 credit hours*

Three hours of lecture per week. The course presents problem solving and analytical structures, and practice in their application by use of a digital computer. Selected portions from the two general processing categories of numerical analysis and information systems are presented for discussion and study. The purpose is to develop an awareness with some understanding and proficiency in automated problem-solving systems. Fall. Mr. C. N. Lee & Staff.

*Prerequisites:* Integral calculus and proficiency in computer programming.

### 571. INTRODUCTION TO STATISTICAL ANALYSIS

*3 credit hours*

Two hours lecture and three hours lab. Elementary probability, sampling distributions, statistical estimation, hypothesis testing, inferences regarding means and variances, simple regression and correlation, and determination of sample size. Fall & Spring. Mr. Kasile.

*Prerequisite:* Junior or Senior standing.

### 591. INTRODUCTION TO PROBABILITY AND STATISTICS

*3 credit hours*

Two hours lecture, three hours lab. Bases for application of standards of accuracy and statistical methods in forest science and technology; elementary probability in relation to the distribution of random errors and the measurement and control of these errors. Fall. Mr. Bickford.

*Prerequisites:* Two semesters of calculus.

### 593. INTRODUCTION TO ANALYSIS OF VARIANCE

*3 credit hours*

Two hours of lecture, three hours lab. One and two-way analysis of variance, multiple comparisons, subsamples, unequal sample size, tests of hypotheses, statistical estimation, determination of sample size. Fall. Mr. Kasile.

*Prerequisites:* AM 571 or AM 591, or equivalent.

### 595. INTRODUCTION TO SAMPLING TECHNIQUES

*3 credit hours*

Two hours lecture, three hours lab. Introduction to the scientific basis of sampling: selecting an appropriate sampling unit; choosing an efficient design; calculating sampling error; determining a sample size to meet stated objectives. Spring. Mr. Bickford & Staff.

*Prerequisites:* AM 571 or equivalent.

### 719. STATISTICAL ANALYSIS

*3 credit hours*

Two hours lecture, three hours lab. A treatment of statistical inference, including paired design, group design, linear regression and correlation, one way analysis of variance, and some applications of chi-square. Calculation of statistics, tests of hypotheses, and proper interpretation of calculated statistics. Fall. Mr. Bickford.

### 720. ANALYSIS OF VARIANCE

*4 credit hours*

Three hours of lecture and recitation, three hours of lab. Multiway classifications in the analysis of variance, with emphasis on the development of models, including randomized blocks, latin squares, split plots, and factorial designs with fixed effects, random effects, and mixed effects; multiple and partial regression and correlation (including curvilinear), using matrix methods; analysis of co-variance, higher order contingency tables, distribution free methods, and sequential testing. Spring. Mr. Kasile.

*Prerequisite:* Graduate standing and an introductory course in statistics covering material through the one-way analysis of variance.

### 760. COMPUTER APPLICATIONS

*3 credit hours*

A course presenting some discussion and practice in the application of computers to the solution of complex large-scale problems. A study of simulation techniques provides the opportunity to apply a computer to the solution of problems normally considered outside the realm of classroom experience. A study of some programming systems permits the opportunity to see how computers are used to solve their own problems of efficiency concerned with time, space and reliability. Spring. Mr. C. N. Lee.

*Prerequisites:* AM 560 and AM 591 or the equivalents.

## BIOLOGY (FOREST BIOLOGY)*

### 301. FIELD BIOLOGY

*1 credit hour*

Five days of field work. A study of biotic groups in terrestrial and aquatic environment; the structure and function of natural communities; the relationship of biota to physical features of the environment. Summer Session in Field Forestry. Mr. Alexander.

*Prerequisite:* A year course in Biology or equivalent.

### 320. GENERAL ECOLOGY

*3 credit hours*

Two hours lecture, three hours of field trips during first half of the semester. Three hours lecture during second half of the semester. Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments, ecological factors, energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography, and representative ecosystems. The ecological impact of man is reviewed. Fall. Mr. Alexander.

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*See also listings for Forest Botany, Forest Entomology and Forest Zoology.

*Prerequisite:* A year course in biology or equivalent.

### 330. PRINCIPLES OF GENERAL PHYSIOLOGY

*3 credit hours*

Three hours of lectures. Introduction to the dynamics of living systems with emphasis on the universality of the biological world. Fall. Mr. Brezner.

*Prerequisite:* One semester of organic chemistry.

### 497. UNDERGRADUATE SEMINAR

*1 credit hour*

Literature surveys and seminars on topics of biological interest and importance. Subject to be generated by faculty and students and to be announced prior to registration. Spring and Fall. Staff.

### 498. RESEARCH PROBLEM IN BIOLOGY

*1–3 credit hours*

Independent research in topics in Forest Biology for the superior undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions, and critiques scheduled as necessary. Final written report required for departmental record. Fall & Spring. Staff.

*Prerequisite:* Consent of instructor.

### 515. ADVANCED LIMNOLOGY

*4 credit hours*

Note: SUNY, Albany No. BIO 516

Eight weeks, two full days/week. Comprehensive analysis of primary and secondary producers in a selected series of Adirondack lakes and streams. Lecture discussion sessions to serve to direct individual student projects detailing the flow of energy and circulation of matter in a variety of mountain habitats. Summer Session I & II, Cranberry Lake Biological Station. Mr. McNaught, SUNYA.

*Prerequisite:* Bio 202, 12 hours of biology.

### 521. ECOLOGY OF FRESHWATERS

*2 credit hours*

Note: SUNY, Albany No. BIO 421

Two full days/week for four weeks. Experimental and observational studies of environmental and biotic interactions, influencing productivity of freshwaters. Basic concepts at the organismic, population, and community level. Summer Session I, Cranberry Lake Biological Station. Mr. Stross, SUNYA.

*Prerequisite:* A course in ecology.

### 571. FUNDAMENTALS OF GENETICS

*3 credit hours*

Three hours of lecture. A general course in genetics covering the inheritance and analysis of Mendelian and quantitative traits; the chemical nature, function, and activity of the gene in cells and development; population genetics, and evolution; and the applications of genetics in animal and plant breeding. Fall. Mr. Valentine.

*Prerequisites:* F Bot 100, F Zool 100, or equivalent courses.

### 572. FUNDAMENTALS OF GENETICS LABORATORY

*1 credit hour*

Breeding experiments with plants and animals demonstrate basic principles of inheritance and changes in populations caused by major forces in evolution or by breeding procedures. Methods and procedures for utilizing bacteria, fungi, and higher plants and animals in genetic experiments are included. Fall. Mr. Valentine.

*Corequisite:* F Biol 571 or equivalent course.

### 620. CHEMICAL ECOLOGY

*3 credit hours*

Two hours of lecture and one hour of discussion. A treatment of biological phenomena incorporating elements of ecology, physiology and chemistry as a basis for development and behavior and survival. Emphasis is on intra- and interspecific relationships involving chemical messengers at the organismal population and community levels. Spring. Mr. Simeone.

*Prerequisites:* Organic Chemistry, General Ecology, General Physiology.

720. PHYSIOLOGICAL ECOLOGY

*2 credit hours*

Note: SUNY, Albany No. BIO 519

Two full days per week for four weeks. Studies of selected plant and animal adaptations to both natural and modified habitats. A physiological approach to understanding the unusual plasticity of plant and animal systems to environmental changes. Summer Session II, Cranberry Lake Biological Station.

721. POPULATION DYNAMICS

*2 credit hours*

Note: SUNY, Albany No. BIO 518

Two full days per week for four weeks. Interrelationships of biotic and environmental factors that control population responses and interactions. Summer Session II, Cranberry Lake Biological Station.

722. BIOCLIMATOLOGY

*2 credit hours*

Note: SUNY, Albany No. ATM 513

Two full days/week, for four weeks. Principles of climatology and meteorology as they relate to studies of the biosphere. Emphasis is upon ecologic problems and microclimatic techniques related to forestry, agriculture, and industry. Summer Session II, Cranberry Lake Biological Station. Mr. Scott, SUNYA.

*Prerequisite:* Consent of instructor.

785. HISTOCHEMICAL TECHNIQUES

*3 credit hours*

One lecture and two labs. The techniques of the microtomecryostat, freeze-drying, and freeze substitution, histochemical stains, and autoradiography in the elucidation of the constitution of cells and tissues. Spring (even calendar years). Mr. Tepper.

*Prerequisites:* Microtechnique and organic chemistry.

835. MEMBRANES AND BIOLOGICAL TRANSPORT

*3 credit hours*

Two hours of lecture and one hour of discussion. Composition, structure and physical properties of membranes. Membrane functions including transport, bioelectricity and cell compartmentalization. Specific transport processes in biological systems. Fall (alternate years). Mr. Schaedle.

*Prerequisites:* One semester of biochemistry and an advanced physiology course, or permission of the instructor.

997. BIOLOGY SEMINAR

*1 credit hour*

One hour of lecture-discussion per week. The course emphasizes current concepts and developments in biology. Fall and/or Spring. Staff.

## BOTANY (FOREST BOTANY AND PATHOLOGY)*

100. GENERAL BOTANY

*4 credit hours*

Prerequisite to all other courses in Botany. Two hours of lecture and four hours of lecture-laboratory in the Auto-tutorial Learning Center. An introduction to plant biology with special emphasis on the structure and function of the green plant. Fall. Mr. Geis.

210. DENDROLOGY I

*2 credit hours*

One hour lecture and one three-hour laboratory/field trip each week. Field study, identification, taxonomy, and elementary silvics of important forest trees of North America. Fall. Mr. Ketchledge.

310. CLASSIFICATION OF THE PLANT KINGDOM

*3 credit hours*

Two hours of lecture and three hours of lab. Introductory study of the Plant Kingdom with emphasis on the angiosperms. Spring. Mrs. Wang & Staff.

330. PLANT PHYSIOLOGY

*2 credit hours*

Two hours of lectures. Descriptive aspects of the fundamental activities of plants. Subjects to be covered include cell structure, water and mineral metabolism, organic nutrition and a brief introduction to biological control mechanisms. Will not satisfy the plant physiology requirement of botany majors. Fall. Mr. Schaedle.

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*See also listings for Forest Biology.

*Prerequisite:* F Bot 100 or equivalent.

### 360. FOREST AND SHADE TREE PATHOLOGY

*3 credit hours*

Two hours of lecture and three hours of laboratory. Major diseases of forest, shade, and ornamental trees and deterioration of forest products will be discussed with emphasis on disease identification, principles of disease development, effects of disease on the host, and practical control measures. Spring. Mr. Silverborg and Mr. Manion.

### 410. DENDROLOGY II

*1 credit hour*

One three-hour field trip/laboratory each week. A continuation of DENDROLOGY I emphasizing trees and shrubs ecologically important in the central New York region and economically important in North America. Fall. Mr. Ketchledge.

### 510. MYCOLOGY

*3 credit hours*

Two hours of lecture, three hours of laboratory. Fundamentals of the morphology, taxonomy, cytology, life histories and ecology of fungi. Laboratory experience in culturing and identification of fungi. Fall. Mr. Griffin.

### 515. SYSTEMATIC BOTANY

*2 or 3 credit hours*

Two hours of lecture, three hours of lab. Identification, nomenclature and classification of flowering plants with special emphasis on local flora and on developing the ability to classify the plants of any region. Spring.

*Prerequisite:* F Bot 310 or permission of the instructor.

### 517. ADIRONDACK FLORA

*1–2 credit hours*

Note: SUNY, Albany No. BIO 517

One day a week for four/eight weeks. Cranberry Lake Biological Station. Field study of the summer flora of the Adirondack Mountains. Sessions I and/or II.

*Prerequisite:* An elementary course in Systematic Botany.

### 522. ECOLOGY OF FOREST COMMUNITIES

*2 credit hours*

Note: SUNY, Albany No. BIO 422

Cranberry Biological Station. Session II. Two full days per week for four weeks. Study of the structural and functional characteristics of selected Adirondack forest ecosystems; techniques of vegetational and environmental analysis. Special requirement: students must be prepared to go on two overnight camping trips to an isolated study area.

*Prerequisites:* At least one semester of General Ecology plus 15 hours of other biological sciences.

### 525. FOREST ECOLOGY

*3 credit hours*

Two hours of lecture/discussion; one laboratory/field trip; one weekend field trip. An advanced course stressing current research in forest dynamics, vegetational development, ecological methods, and phytosociology. Spring. Mr. Ketchledge.

*Prerequisites:* F Bot 210; F Biol 320 or Silvi 521.

### 527. BRYOECOLOGY

*2 credit hours*

Two full days a week for four weeks. Field and laboratory work at the Biology Station. Study of the bryoflora of the major ecosystems of the Adirondack Mountain region. Summer Session I, Cranberry Lake Biology Station.

*Prerequisites:* Survey of the Plant Kingdom; Systematic Botany; General Ecology.

*Special requirement:* Students must be prepared to go on two overnight trips to isolated areas.

### 530. PLANT PHYSIOLOGY

*2 credit hours*

Two hours of lecture. Internal processes and conditions in higher plants with emphasis on physiological and biochemical concepts. For students majoring in the biological sciences. Spring. Mr. Wilcox.

*Note:* Botany majors electing this course must also take F Bot 531.

### 531. PLANT PHYSIOLOGY LABORATORY

*2 credit hours*

Two lab sessions. Introduction to current methods and procedures of physiological research including nutrition, tissue culture, photosynthesis, respiration, and hormonal regulation of growth. Spring. Messrs. Wilcox and Schaedle.

*Prerequisites:* F Biology 330, corequisite F Botany 530, or permission of the instructor. Advance tentative registration with the instructor is required.

### 561. PRINCIPLES OF FOREST PATHOLOGY

*3 credit hours*

Three hours of lecture discussion. Concepts and principles of tree diseases in relation to forest practice. Fall. Mr. Manion.

*Prerequisite:* Forest Botany 360 or consent of instructor.

### 562. WOOD DETERIORATION BY MICROORGANISMS

*3 credit hours*

Two hours of lecture, three hours of laboratory/field trip. Major types of fungus defects of wood and its products and principles of control. Special emphasis on chemistry of wood decay, wood durability, toxicants, lumber discolorations, heartrots and decay in forest products. Fall. Mr. Silverborg.

*Prerequisite:* Organic Chemistry, F. Bot. 360 or consent of instructor. Course offered in even calendar years.

### 585. PLANT ANATOMY

*3 credit hours*

Two hours of lecture, three hours of lab. An introductory course in plant anatomy designed to familiarize the student with the organization and development of the primary and secondary plant body of higher plants. Spring. Mr. Tepper.

*Prerequisite:* F Bot 100.

### 630. FUNGUS PHYSIOLOGY

*3 credit hours*

Two hours of lecture, one hour of discussion. Principles of growth, reproduction and differentiation of the fungi emphasizing the role of the environment in controlling fungal processes. Spring (even years beginning in 1970). Mr. Griffin.

*Prerequisites:* Two semesters of physiology or biochemistry.

### 660. PHYTOPATHOLOGY

*3 credit hours*

Two two-hour discussions. Principles and concepts of plant pathology. Major diseases of ornamental plants, vegetable crops, fruit crops, field crops, and trees. Spring (odd-numbered years).

*Prerequisite:* Forest Botany 510 and a course in plant pathology or permission of the instructor.

### 715. ADVANCED SYSTEMATIC BOTANY

*2 or 3 credit hours*

Lectures and lab. Field trips. Advanced study in the identification, nomenclature, and classification of flowering plants. Special emphasis on Gymnospermae, Compositae, and Gramineae. Fall.

*Prerequisite:* F Bot 515 or equivalent.

### 733. TECHNIQUES IN PLANT PHYSIOLOGY

*2–4 credit hours*

Comprehensive study of techniques essential for research in plant physiology. Students may choose the instructors they wish to work with, and should consult the instructors for further details. Fall of every year. May be repeated for credit in different specialties. Staff.

*Prerequisite:* F. Bot. 530 and 531 or an equivalent physiology course, biochemistry with laboratory or consent of the instructor.

### 761. TOPICS IN PHYTOPATHOLOGY

*3 credit hours*

Two two-hour lecture-discussions. Discussions of specific phytopathological subjects. Topic selection is based on availability of expertise and will be announced in advance. Fall or Spring. Staff. This course may be repeated for credit in different specialties.

### 797. BOTANY SEMINAR

*1 credit hour*

Seminar discussions of subjects of interest and importance to the biology of plants. Fall and Spring. Staff.

798. RESEARCH IN FOREST BOTANY

*Credit hours arranged according to nature of problem*

Advanced study and research problems in forest pathology, wood deterioration, tree physiology, anatomy, mycology, ecology, taxonomy, and genetics. Typewritten report required. Fall and Spring. Staff.

810. ADVANCED MYCOLOGY, HOMOBASIDIOMYCETES

*3 credit hours*

Review of selected literature as well as laboratory training in identification and research techniques. Fall. Mr. Lowe & Staff.

*Prerequisite:* F Bot 510. Course offered in odd calendar years.

811. ADVANCED MYCOLOGY, HETEROBASIDIOMYCETES

*3 credit hours*

Review of selected literature as well as laboratory training in identification and research techniques. Spring. Mr. Lowe & Staff.

*Prerequisite:* F Bot 510. Course offered in even calendar years.

812. ADVANCED MYCOLOGY, ASCOMYCETES

*3 credit hours*

Review of selected literature as well as laboratory training in identification and research techniques. Fall. Mr. Lowe & Staff.

*Prerequisite:* F Bot 510. Course offered in even calendar years.

813. ADVANCED MYCOLOGY, MYXOMYCETES, PHYCOMYCETES, FUNGI IMPERFECTI

*3 credit hours*

Review of selected literature as well as laboratory training in identification and research techniques. Spring. Mr. Lowe & Staff.

*Prerequisite:* F Bot 510. Course offered in odd calendar years.

830. PHYSIOLOGY OF GROWTH AND DEVELOPMENT

*2 credit hours*

Lecture. A study of the growth and development of plants and the physiological and biochemical processes that influence the development of form and structure in higher plants. Fall (even years). Mr. Wilcox.

*Prerequisites:* F Bot 530, 585, and organic chemistry or permission of instructor.

870. POPULATION GENETICS

*Three hours of lecture. 3 credit hours*

The principles and theorems of population genetics based upon gene frequencies and genic effects in theoretical populations. Effects of inbreeding, selection, mutation, fitness, migration, and other factors are considered. Composition and changes in natural and laboratory populations are related to genetic theory. Spring (even numbered years.) Mr. Valentine.

*Prerequisites:* F Biol 571 & 572, 1 semester of calculus; AM 720, or permission of instructor.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## CHEMISTRY (FOREST CHEMISTRY)

221. ORGANIC CHEMISTRY I

*3 credit hours*

Two hours of lecture, one hour of recitation. A survey of representative classes of carbon compounds with an emphasis on structure, nomenclature and fundamental reactivity and other important properties, uses, and characteristics. Fall. Mr. Silverstein and Staff.

*Prerequisite:* One year of Freshman chemistry.

222. ORGANIC CHEMISTRY LABORATORY I

*1 credit hour*

One three-hour laboratory period. Laboratory techniques in organic chemistry. Melting points, distillation, recrystallization, extraction, column and thin layer chromatography. Qualitative organic functional group analysis. Fall. Staff and laboratory assistants.

*Prerequisite:* One year of Freshman chemistry.

### 223. ORGANIC CHEMISTRY II

*3 credit hours*

Two hours of lecture, one hour of recitation. A study in depth of the reactivity characteristics of the various classes of carbon compounds. The relation of chemical reactivity and physical properties to electronic and three dimensional characteristics of carbon compounds. Spring. Mr. LaLonde & Staff.

*Prerequisites:* One year of Freshman chemistry and one semester of organic chemistry.

### 224. ORGANIC CHEMISTRY LABORATORY II

*1 credit hour*

One three-hour laboratory period. Continuation of F Chem 222. Simple physical, quantitative and instrumental techniques applied to organic chemistry. Gas chromatography, polarimetry, kinetics. Introduction to synthesis. Spring. Staff and laboratory assistants.

*Prerequisite:* F Chem 222 or equivalent.

### 325. ORGANIC CHEMISTRY III

*3 credit hours*

Two hours of lecture, one three-hour lab period. Classical and recent literature syntheses of organic compounds, employing advanced techniques. Fall. Mr. LaLonde.

*Prerequisite:* Two semesters of elementary organic chemistry.

### 495. INTRODUCTION TO PROFESSIONAL CHEMISTRY

*2 credit hours*

Professional ethics and responsibilities of the practicing chemist. Employer-employee relations, legal and legislative relations. Alternate employment opportunities. Professional organizations. Safety in the laboratory. Organization and use of chemical literature. Selection of research topic and literature survey. Fall. Mr. Schuerch and Staff.

*Prerequisite:* Upper division status. Senior status preferred.

### 496. SPECIAL PROBLEMS IN CHEMISTRY

*1–3 credit hours*

An opportunity for a special problem, technique development, independent or unstructured study in an area related to the chemical profession. The work may be technical, professional, or interdisciplinary. Advisors outside this department may be solicited. A brief proposal must be presented for approval with specific arrangements outlined including faculty advisor and objectives of the study. Evidence of competence and appropriate effort is required for credit. A written report will usually be expected. Fall and Spring. Staff.

*Prerequisite:* Upper division status.

### 497. UNDERGRADUATE SEMINAR

*1 credit hour*

One hour per week. Literature surveys and seminars on topics of current research interest and recent advances in Chemistry. Spring. Mr. Walton.

### 498. INTRODUCTION TO RESEARCH

*5 credit hours*

Eighteen hours of laboratory per week, library search and report writing. Solution of a selected research problem using special laboratory techniques. Typewritten report on data, procedures, results and conclusions. Spring. Staff.

### 520. NUCLEAR AND RADIATION CHEMISTRY

*2 credit hours*

The two one-hour lectures will cover the information required for the basic understanding of nuclear reactions, the types of radiation emitted, the instrumentation necessary to detect and measure this radiation, the principles of radioisotope tracer techniques, and radiation chemistry which is the effect of radiation on organic systems. Visits to the Cornell Reactor and the Nuclear Medicine Department of the Upstate Medical Center will be arranged. Spring. Dr. John A. Meyer.

*Prerequisites:* Physical, organic and inorganic chemistry or by permission of the instructor.

*Note:* This course can be taken independently of F Chem 521.

### 521. NUCLEAR CHEMICAL TECHNIQUES

*1 credit hour*

The laboratory will consist of one four-hour laboratory class every two weeks, with one hour to be made up at the student's discretion to accommodate counting periods which extend over several weeks. A short movie by the AEC each week will be required for the sixth hour. The laboratory will give each student the opportunity to use the individual counting instruments, gain experience in the handling and preparation of radioactive samples and the use of the 1000 Curie cobalt source in radiation chemistry. Spring. Dr. John A. Meyer.

*Prerequisites:* Physical, organic and inorganic chemistry or permission of the instructor. Advance tentative registration is required.

*Corequisite:* F Chem 520.

### 530. BIOCHEMISTRY I

*3 credit hours*

Three hours of lecture. General biochemistry with emphasis on cellular constituents and metabolic reactions. The chemical, physical and biological properties of amino acids, proteins, carbohydrates and their intermediary metabolism will be discussed. The chemistry of enzymes, energy transfers and biological oxidations will also be covered. Fall. Mr. Sondheimer.

*Prerequisite:* One year of organic chemistry.

*Pre- or corequisite:* One year of physical chemistry.

### 531. BIOCHEMISTRY LABORATORY

*2 credit hours*

Six hours of laboratory. This course will stress techniques used in biochemical research. Techniques used include various types of chromatography, electrophoresis, and spectrophotometry, and metrods involved in the isolation, purification and assay of enzymes. Fall. Mr. Walton.

*Prerequisite:* One semester of quantitative analysis with laboratory.

### 532. BIOCHEMISTRY II

*3 credit hours*

Three hours of lecture. Topics discussed are: application of tracer techniques to biochemistry, the chemical and biochemical properties of lipids, theories on the origin of life, photosynthesis and the biosynthesis of steroids and terpenes, plant aromatics, amino acids, porphyrins, and other aspects of nitrogen metabolism. Spring. Mr. Sondheimer.

*Prerequisites:* F Chem 530 and its pre- and corequisites.

### 539. PRINCIPLES OF BIOLOGICAL CHEMISTRY

*3 credit hours*

Three hours of lecture. Principles of biochemistry with emphasis on their relationship to biology. Topics include basic metabolic pathways, structure and function of proteins, enzymes, and nucleic acids, energy relationships, and biochemical control mechanisms. Fall. Mr. Walton.

*Prerequisites:* A two-semester course in organic chemistry desirable, but a one-semester course is acceptable. This course not open to Forest Chemistry majors.

### 550. INTRODUCTION TO POLYMER CHEMISTRY I

*3 credit hours*

Three hours of lecture. Mechanism and kinetics of condensation and addition polymerization. Stereochemistry of macromolecules. Chain conformation anl polymer solution theory. Methods of molecular weight determination. Fall. Mr. Smid.

*Prerequisites:* One year of organic and physical chemistry.

### 551. POLYMER TECHNIQUES

*2 credit hours*

One hour of lecture-discussion and three hours of lab; lab reports. Techniques of polymer preparation: free radical solution and emulsion polymerization, copolymerization. Molecular weight determination by light scattering, osmometry, viscosity, ultracentrifugation. Structure characterization by x-ray diffraction, electron microscopy, nuclear magnetic resonance, optical rotatory dispersion, polarized microscopy, stress-strain and swelling equilibrium. Fall. Mr. Sarko.

*Prerequisites:* One year of organic and one year of physical chemistry. Concurrent F Chem 550 recommended.

### 552. INTRODUCTION TO POLYMER CHEMISTRY II

*3 credit hours*

Three hours of lecture. Theory of gelatin and network formation. Rubber elasticity, the glassy state and glass transition temperature, the crystalline state and crystallization kinetics, characterization of structure of solid states. Manufacturing and fabrication processes for films, fibers, and plastics. Physical properties and their relation to end use. Spring. Mr. Sarko.

*Prerequisites:* One year organic and physical chemistry, F Chem 550 recommended.

### 556. POLYMER PROPERTIES

*3 credit hours*

Three hours of lecture. Introduction to the physical chemistry of polymers. Includes a description and classification of polymers, crystallization, glass transition, statistics of macromolecules, rubber elasticity, visco-elasticity, polymer solutions, phase equilibria, viscosity, properties of fibers, films, foams, composites. Electrical and optical properties of polymers. Fall. Mr. Smith.

*Prerequisite:* One year of organic chemistry and one year of physical chemistry.

### 575. WOOD CHEMISTRY I

*2 credit hours*

Four hours of lecture first half of semester. Introduction to carbohydrate chemistry. Chemistry of cellulose, hemicelluloses, and lignin. Cellulose derivatives. Wood extractives. Bark Chemistry. Distribution of the cell wall constituents in wood. Fall. Mr. Timell.

*Prerequisite:* F Chem 221–224 or equivalent.

### 576. WOOD CHEMISTRY II

*2 credit hours*

Four hours of lecture second half of semester. Interaction of cellulose with water and alkali. Effect of acids on cellulose, hemicelluloses, and lignin. Sulfonation and oxidation of lignin. Action of alkali on cellulose, hemicelluloses, and lignin. Topochemistry of the major wood delignification reactions. Wood defects. Chemical byproducts from wood. Manufacture of cellulose acetate and rayon. Fall. Mr. Timell.

*Prerequisite:* F Chem 575.

### 577. WOOD CHEMISTRY III

*2 credit hours*

Two hours of lecture. Chemistry of starch, pectin, and callose. Biosynthesis of cellulose, hemicelluloses, starch, pectin, callose, and lignin. Chemistry of the cambium and formation of xylem and phloem. Lignification. Earlywood, latewood, juvenile wood, and reaction wood. Aging and chemistry of the biodegradation of wood. Spring. Mr. Timell.

*Prerequisite:* F Chem 575.

### 578. WOOD CHEMISTRY LABORATORY

*1 credit hour*

One three-hour laboratory period. Wood analyses. Isolation of holocellulose and xylan. Proof of structure of cellulose. Preparation of carboxymethylcellulose. Characterization of wood polysaccharides by chromatographic techniques. Fall. Mr. Timell.

*Prerequisite:* F Chem 221–224 or equivalent.

### 584. SPECTROMETRIC IDENTIFICATION OF ORGANIC COMPOUNDS

*1–2 credit hours*

Two hours of lecture and discussion. The first half semester (1 credit) will deal with common classes of organic compounds; the second half semester (1 credit) will deal with more complex structures. The use of complementary information from mass, infrared, nuclear magnetic resonance and ultra violet spectrometry will be applied to identification of organic natural products. Fall or Spring. Mr. Silverstein.

*Prerequisites:* Organic Chemistry; one semester of advanced organic for second credit.

### 796. SPECIAL TOPICS IN CHEMISTRY

*1–3 credit hours arranged according to nature of topic*

Lectures, conferences, and discussion. Advanced topics in physical chemistry, organic chemistry, or biochemistry. Fall and Spring. Staff.

### 798. RESEARCH IN CHEMISTRY

*Credit hours arranged according to nature of problem*

Independent research in physical and organic chemistry of synthetic polymers, physical and organic chemistry of natural polymers, organic chemistry of natural products, ecological chemistry and biochemistry. One typewritten report required. Fall and Spring. Staff.

### 830. TOPICS IN PLANT BIOCHEMISTRY

*3 credit hours*

Three hours lecture and discussion. Covers topics in biochemistry unique to plants, including photosynthesis, biosynthesis of cell-wall components, phenolics, terpenes, nitrogen metabolism, structure and function of plant hormones, biochemistry of differentiation and growth regulatory mechanisms. Spring (alternate years). Mr. Walton.

*Prerequisites:* F Chem 530, F Chem 532, or equivalents.

### 850. ORGANIC CHEMISTRY OF POLYMERS

*3 credit hours*

Three hours of lecture, discussion and recitation. A broad survey of polymer forming reactions and polymeric structures. Special problems in stereochemistry, polymerization mechanisms, and the synthesis of a variety of specialty polymers. Some relations between molecular structure and useful properties. Spring. Mr. Caluwe.

*Prerequisites:* One year of organic chemistry and F Chem 550.

### 855. PHYSICAL CHEMISTRY OF POLYMERS

*3 credit hours*

Three hours of lecture and discussion. Introduction to statistical mechanics of polymers: general problem of random flight, chain statistics and conformations, partition functions: network statistics and rubber elasticity, birefringence, swelling, crystallization. Scattering phenomena: theory of light scattering, scattering from a sphere, scattering from liquids and solids, anisotroph scattering, x-ray scattering. Fall or Spring. Mr. Sarko and Mr. Smith.

*Prerequisites:* F Chem 550 and 552 (or equivalent), Chemistry 656.

### 884. ORGANIC NATURAL PRODUCTS CHEMISTRY

*3 credit hours*

Three hours lecture. The chemistry of terpenoids, steroids and alkaloids with an emphasis on the determination of structure by both modern instrumental methods and chemical degradation. Biogenetic considerations and the confirmation of structure by synthesis are covered. Fall or Spring. Mr. LaLonde.

*Prerequisites:* One semester of advanced organic chemistry.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 997. SEMINAR

*1 credit hour*

Seminars scheduled weekly; an average of twenty to thirty seminars are given annually. Discussion of recent advances in chemistry. Credit is given only once to a student. Fall and Spring. Mr. Adams.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## ECONOMICS (FORESTRY ECONOMICS)

### 290. INTRODUCTION TO ECONOMICS FOR FORESTRY

*3 credit hours*

Three hours of lecture and discussion. Population and resources. Trends in the American economy. Supply and demand. Theory of the firm and industry. Composition, measurement, and determination of national income. Monetary and fiscal policies. The roles of government, business and labor. Comparative economic systems. General economic principles are stressed. Spring. Mr. Petriceks.

### 300. INTRODUCTION TO MACRO-ECONOMICS

*3 credit hours*

Three hours of lecture and discussion. Composition, measurement, and determination of national income. Financial institutions of the United States. Monetary and fiscal policies. The Theory of Economic Growth and problems in attaining adequate levels of economic growth. Spring. Mr. Bennett & Staff.

### 301. INTRODUCTION TO MICRO-ECONOMICS

*3 credit hours*

Three hours of lecture and discussion. Pricing and resource allocation. Supply and demand. Theory of the firm and industry. The role of labor unions in the American economy. Problems in anti-trust policy. The Theory of International Trade. Fall. Mr. Bennett & Staff.

### 496. SPECIAL TOPICS IN RESOURCE ECONOMICS

*1–3 credit hours*

Guided readings, lectures and tutorial conferences for the undergraduate student from any school of the College, designed to help him apply economic analysis to questions within his area of interest. Illustrative topics include the economics of land use and planning; of forest culture; of outdoor recreation; of water or timber management, or related resource production; of wood-using industry; and of the distribution or consumption of forest resources. Fall and Spring. Staff.

*Prerequisite:* Consent of instructor.

### 510. PRINCIPLES OF FORESTRY ECONOMICS

*3 credit hours*

Two hours of lecture, three hours of laboratory. Economics of the production of forest goods and services. Land, labor and capital and their combination in forest production. Supply and demand of various forest products and their changes over time. Economics of taxation and public policy formation. Emphasis is placed upon principles and methods of analysis useful in understanding and in making resource management decisions. Fall. Mr. Christiansen.

*Prerequisite:* F Econ 301 or equivalent.

### 511. ECONOMICS OF THE FOREST BUSINESS

*3 credit hours*

Two hours of lecture, three hours of laboratory. Economic evaluation of alternative uses of land, labor, and capital in the operation of forest properties and related marketing and processing enterprises. Emphasis is on application of principles and methods of economic analysis. Part of the term is spent in appraising a forest property and preparing a plan for its operation. Complementary to instruction in FM 556. Spring. Mr. Christiansen.

*Prerequisite:* F Econ 510 or permission of the instructor.

### 520. ECONOMICS OF WOOD-USING INDUSTRIES

*3 credit hours*

Three hours of lecture and discussion. Structure and organization of selected wood-using industries. Analysis of decision-making by the firm. Principles of production and marketing including demand and cost analysis and pricing. Special issues and current problems of the industries, and introduction to the newer mathematical and statistical tools for meeting them. Spring. Mr. Armstrong.

*Prerequisite:* F Econ 290 or equivalent.

### 550. FORESTRY AND ECONOMIC DEVELOPMENT

*3 credit hours*

Three hours of lecture and discussion. Study of the role of forest resources in the process of economic development. Characteristics of forest resources which are important for economic development are analyzed in detail. Interrelationships between biological, technological and institutional factors are stressed. Fall. Mr. Petriceks. Offered to seniors and graduate students in environmental and resources management. Open to others by permission of instructor.

*Prerequisites:* F.E. 510 or its equivalent.

### 570. ECONOMICS OF OUTDOOR RECREATION

*3 credit hours*

Group discussion, lectures, guided reading, and student essays on the economic aspects of outdoor recreation. Major topics include: supply and demand for outdoor recreation; theories of value and choice for both recreationists and recreation-resource managers; the role of outdoor recreation in economic development; and application of economic analysis to recreation planning and public policy issues. Spring. Mr. Canham.

*Prerequisites:* F Econ 290 or 301, or equivalent; EI 511 recommended.

### 710. ADVANCED PRINCIPLES OF FORESTRY ECONOMICS I

*3 credit hours*

Two hours of lecture, two hours of discussion. Intensive study of the micro-economics of forestry. Offered only to graduate students. Fall. Mr. Duerr.

### 711. ADVANCED PRINCIPLES OF FORESTRY ECONOMICS II

*3 credit hours*

Two hours of lecture, two hours of discussion. Intensive study of the macro-economics of forestry. Offered only to graduate students. Spring. Mr. Duerr.

### 796. SELECTED TOPICS IN THE ECONOMICS OF FORESTRY

*Credit hours to be arranged*

Study of a topic in forestry economics, with emphasis on wide reading, original thinking, and analytical writing. Fall & Spring. Staff.

### 797. SEMINAR

*1–3 credit hours*

Group discussion and individual conference. Critical examination of economic ideas and policies in forestry. Topics of interest to the group are selected for study, such as current developments in analytical method or in economy policy, the economic problems of small business in forestry, national or world requirements for the goods and services of the forest, or the economy of a forest region. Primarily for graduate students in forestry economics and world forestry. Fall & Spring. Staff.

### 800. HISTORY OF ECONOMIC THOUGHT IN FORESTRY

*3 credit hours*

Three hours of discussion or conference. Systematic study and critique of the development of the thinking of foresters and economists with respect to some segment of the subject matter of forestry economics. Review of major individual contributions to thought and the influence of leading scholars upon the thinking of others. Appraisal of the leading schools of thought. Offered only to graduate students. Fall or Spring. Mr. Bennett.

### 830. RESEARCH METHODS

*3 credit hours*

Three hours of discussion or conference. Study of the elements of research methodology and their application in identifying, analyzing and resolving problems in forestry economics. Fall. Staff.

*Prerequisites:* Offered to Ph.D. candidates in Forestry Economics. Open to others by permission of instructor.

### 840. PROFESSIONAL WORKSHOP IN FORESTRY ECONOMICS

*3 credit hours*

Two hours of seminar and one three-hour laboratory each week. F Econ 840 is an internship-workshop in the interpretation of forest economics. The seminars are devoted to problems of programming, materials, instruction, testing, and evaluation. The laboratory incorporates leading a one-hour discussion group in F Econ 301, with preparation for that discussion group and with the writing of a report on the laboratory to be used in a subsequent seminar meeting. Fall. Mr. Bennett.

*Prerequisites:* Econ 605, Econ 606, and either F Econ 830 or permission of instructor.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## ENGINEERING (FOREST ENGINEERING)*

### 300. FOREST ENGINEERING PROBLEMS

*1 credit hour*

One hour of lecture and discussion. An introduction to methodologies for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Fall and Spring. Staff.

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*See also listings for Forest Management.

*Prerequisite:* Junior Standing in F Engr.

### 301. PLANE AND GEODETIC SURVEYING

*3 credit hours*

Two hours lecture and recitation, three hours of lab. A treatment in depth of the principles of plane surveying, with particular emphasis on the analysis of errors, curvilinear survey, astronomical observations and potential computer relationships. Spring. Mr. Bender.

*Prerequisite:* A M 591.

### 310. FOREST ENGINEERING PROBLEMS

*3 credit hours*

Three hours of lecture and discussion. An introduction to methodologies of forest measurements for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Fall. Staff.

### 340. HYDROLOGY

*3 credit hours*

Two lectures and three hours of lab per week. The mechanics of water storage and dispersion; hydrostatics; stream function; velocity potential; dimensional analysis and momentum theory. The natural hydrologic cycle is studied in relationship to changes and structural controls imposed by man. Spring. Mr. Tully.

*Prerequisites:* Dynamics (or concurrent), Introductory Statistics.

### 342. HYDRAULICS IN CONSTRUCTION

*4 credit hours*

Three hours of lecture, three hours of laboratory. The physical, mechanical, thermal and hydraulic properties of fluids relevant to the construction industry. A study of solutions to hydraulic problems in contemporary construction activities. Not open for credit to forest engineering students. Spring. Staff.

*Prerequisites:* Physics and Differential Calculus.

### 410. STRUCTURES

*4 credit hours*

Three hours of lecture, three hours of laboratory. Engineering principles in the analysis, planning, design, construction, and maintenance of forest structures such as timber bridges, trusses, towers, dams, water supplies, sewage systems, and other facilities. Properties of timber, concrete, steel, and other structural materials. Fall. Mr. Tully.

*Prerequisite:* CIE 325 or concurrent registration.

### 412. PRINCIPLES OF PRODUCTION (HARVESTING)

*3 credit hours*

Three lectures per week. Fundamentals of harvesting wood products for optimum utilization; principles of production management, materials handling and transportation systems, inventory and cost control, product and market development; utilization problems. Analysis of integrative case situations for wood-based enterprises. Fall. Mr. Palmer.

*Prerequisite:* F Mgt 522.

### 442. HYDRAULIC OPERATIONS

*2 credit hours*

Three hours of lecture, three hours of laboratory. A seven-week course beginning at mid-semester, which studies solutions to hydraulic problems in contemporary construction operational activities. Not open to students having previous credit for F Engr 342. Spring. Staff.

*Prerequisites:* Senior class standing in engineering or permission of instructor based on a background in hydraulics.

### 502. TERRESTRIAL GEODESY

*3 credit hours*

Two hours lecture and three hours laboratory. Theory and techniques of collection, reduction, and adjustment of precise geodetic measurements for leveling, triangulation, and trilateration. Fall. Mr. Bender.

*Prerequisites:* F Engr 301 or equivalent.

### 503. ASTRO-GEODESY

*3 credit hours*

Two hours lecture and three hours laboratory. Theory and techniques of collection, reduction, and adjustment of astronomical observations for position, direction, and time determination with emphasis on satellite geodesy. Spring. Mr. Bender.

*Prerequisite:* F Engr 301 or equivalent.

### 510. TRANSPORTATION SYSTEMS

*3 credit hours*

Two hours of lecture and three hours of laboratory. Interrelationships among natural features, transportation types, design, and management objectives to provide the most effective system within the given framework. Basic engineering principles in the planning, location, design, construction, and maintenance of suitable transportation systems to serve various aspects of forest resource management. Spring. Staff.

*Prerequisites:* F Engr 301 and F Engr 531 or equivalents.

### 530. SOIL MECHANICS

*2 credit hours*

Two hours of lecture, three hours of laboratory (9 weeks only). The physical, mechanical and hydraulic properties of cohesive and non-cohesive soils. A nine-week course, concluding with specifications of engineering soils. Credit towards forest engineering degree may be granted only by the completion of additional assigned work. Fall. Mr. Tully.

*Prerequisite:* Senior class standing or permission of instructor.

*Note:* A student may not enroll in and receive credit for both F Engr 530 and F Engr 531.

### 531. SOIL MECHANICS FOR ENGINEERS

*3 credit hours*

Two hours of lecture, three hours of lab. The physical, mechanical, and hydraulic properties of cohesive and non-cohesive soils. Application of these and other engineering principles to the design of earthen structures common to the forest environment. Fall. Mr. Tully.

*Prerequisites:* F Engr 340; also, CIE 325 concurrently.

*Note:* A student may not enroll in and receive credit for both F Engr 530 and 531.

### 540. HYDROLOGIC CONTROLS

*3 credit hours*

Three hours of lecture and discussion. A continuation of F Engr 340, emphasizing the application of hydrologic principles. Basic hydraulics of controlling structures, open channel flow, sedimentation, filtration systems, reservoirs and water law as applied to forest and range land hydrology. Spring. Mr. Hawkins.

*Prerequisites:* F Engr 340, F Engr 530 or F Engr 531, CIE 327 or equivalents as evaluated by the instructor.

### 560. THEORY OF ERRORS AND ADJUSTMENTS

*3 credit hours*

Two hours of lecture and three hours of laboratory. The theory of errors and adjustment of observations oriented toward geodesy and photogrammetry. Topics include error definitions, weighted observations, method of least squares, matrix algebra in adjustments, variance-covariance matrix, the error ellipse and the general case of adjustment. Fall or Spring. Mr. Brock.

*Prerequisite:* Calculus, A.M. 591 or equivalent.

### 563. PHOTOGRAMMETRY

*3 credit hours*

Two hours of lecture and discussion, three hours of lab. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation, and unique requirements are considered. Fall & Spring. Mr. Stanton.

*Prerequisites:* F Mgt 201 (or F Mgt 301 concurrent).

### 564. PHOTOGRAMMETRY II

*3 credit hours*

Two hours lecture, three hours laboratory. Mathematical theory of photogrammetry including space resection, orientation and intersection. The theory and use of photogrammetric analogue computers in providing resource engineering maps. Fall. Mr. Brock.

*Prerequisite:* F. Engr. 563 or equivalent.

### 566. REMOTE SENSOR INTERPRETATION

*3 credit hours*

Two hours of lecture, three hours of lab. An introduction to remote sensing technology as applied to detection and analysis of the forest environment, soil, water, climate, and vegetation, as an aid to multiple use management. Spring. Staff.

### 567. REMOTE SENSOR THEORY

*3 credit hours*

Two hours lecture and three hours laboratory of an in-depth coverage of the theory of remote sensing of the electro-magnetic spectrum and the various methods of phase and amplitude recording. Holographic, photographic, and line scan recordings will be covered. Spring. Staff.

*Prerequisites:* F Engr 563, Math 398 or equivalent.

### 599. FOREST ENGINEERING PLANNING

*3 credit hours*

Three hours of lecture and three hours of laboratory. A synthesis of the fundamental areas of forest engineering in the planning of the physical development of the forest resources. Specific design studies will be made emphasizing the interrelationship of man, forest resources and their multiple services. These studies will lead to the development and application of planning to simulated realistic conditions. Spring. Staff.

### 664. TERRESTRIAL AND NON-TOPOGRAPHIC PHOTOGRAMMETRY

*3 credit hours*

Two hours of lecture, three hours of laboratory per week. The theory and applications of terrestrial and non-topographic photo measurements. Photo-Theodolites, short-focus cameras, and microscopes are used and calibrated to provide meaningful quantitative data from photographs. Spring. Mr. Brock.

*Prerequisites:* F Engr 563 and A M 360 or equivalent.

### 760. ANALYTICAL PHOTOGRAMMETRY I

*3 credit hours*

Two hours of lecture, three hours of lab per week. Mathematical theory of photogrammetry including space resection, orientation, intersection and aerial triangulation. Fall. Mr. Brock.

*Prerequisites:* F Engr 563 and A M 360 or equivalent.

### 761. ANALYTICAL PHOTOGRAMMETRY II

*3 credit hours*

Two hours lecture, three hours lab. A continuation of Forest Engineering 760 leading to more extensive analytical solutions with frame and non-conventional photography. The distortions present in photographs are analyzed and camera and comparator calibrations are treated. Spring. Mr. Brock.

*Prerequisite:* F Engr 760.

### 762. INSTRUMENTAL PHOTOGRAMMETRY I

*3 credit hours*

Two hours of lecture, three hours of lab. The theory and practice of extracting information from photographs with the aid of photogrammetric plotters. Fall. Mr. Brock.

*Prerequisite:* F Engr 563 or equivalent.

### 763. INSTRUMENTAL PHOTOGRAMMETRY II

*3 credit hours*

Two hours lecture, three hours lab. The major subjects of study are photogrammetric optics, the theory and design of optical and mechanical plotters and automatic mapping systems. Spring. Mr. Brock.

*Prerequisite:* F Engr 762 or permission of instructor.

## ENGLISH (COLLEGE OF FORESTRY COURSES)

### 210. ADVANCED COMPOSITION AND LITERATURE

*2 credit hours*

Further development of reading and writing skills acquired in Freshman English. Understanding of imaginative literature promoted through the study of selected works in American literature in their historical context. Practice in the principles and techniques of critical writing coordinated with reading assignments. Fall. Mrs. Sutton and Mr. Lalor.

### 211. TECHNICAL WRITING

*2 credit hours*

Instruction in the principles and techniques of technical writing in general; in the letter, memorandum, and report, and in the special techniques of technical writing in particular. Course work includes lectures and discussions, reading assignments in the required text and supplementary materials, and numerous written assignments including a formal report presenting the results of an investigation. Spring. Mrs. Sutton and Mr. Lalor.

## ENTOMOLOGY (FOREST ENTOMOLOGY)*

### 300. PRINCIPLES OF FOREST ENTOMOLOGY

*2 credit hours*

Elements of insect classification, living requirements, and control manipulations that are prerequisite with further study, to an understanding of insects in relation to applied aspects of forestry. One hour of lecture, three hours of lab/field work. Spring. Mr. Allen.

### 500. ELEMENTS OF FOREST ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab/field work. General classification of insects, morphology, physiology, ecology, behavior, and basic principles of population control. Emphasis through illustration is on the role of insects in the forest environment. Fall. Mr. Simeone.

*Prerequisites:* F. Bot 100 and F. Zool 100.

### 502. FOREST AND SHADE TREE ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab/field trip. Important forest and shade tree insects; detection, evaluation, prevention and control of their damage; their relationship to silviculture and management of forests and shade trees. Spring. Mr. Lanier.

*Prerequisites:* F. Ento 500 or F. Ento 300.

### 504. INSECTS AFFECTING FOREST PRODUCTS

*3 credit hours*

Two hours of lecture and one hour of lab. Biology, identification, ecology of insect and wood interrelations, prevention of injury and control of insects injurious to forest products and wood in use. Spring. Mr. Simeone.

*Prerequisite:* F. Ento 500 or F. Ento 300. Exceptions with permission of instructor.

### 505. SURVEY OF ENTOMOLOGICAL LITERATURE AND HISTORY

*1 credit hour*

One hour of lecture. A survey of history of entomology and related sciences. Library techniques and literature sources are discussed with emphasis on entomological bibliography. Spring. Mr. Brezner.

### 550. FOREST AND AQUATIC INSECTS

*2 credit hours*

The forest and aquatic insects of Cranberry Lake Region and their role in these environments and habitats. Insect collection required. Summer (four-week period), Cranberry Lake Field Biology Station. Staff.

*Prerequisites:* Background in botany, zoology, systematics and ecology.

### 580. INSECT MORPHOLOGY

*3 credit hours*

Two hours of lecture, three hours of laboratory. A comparative study of the external morphology of insects emphasizing evolutionary trends, especially modifications of homologous structures. Topics of special importance include intersegmental relationships, feeding, sensory mechanisms, locomotion, and reproduction. Fall. Mr. Kurczewski.

*Prerequisite:* F. Ento 500.

### 610. GENERAL INSECT TAXONOMY

*3 credit hours*

Two hours of lecture, three hours of laboratory. Identification and classification of the important orders and families of insects;

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*See also listings for Forest Biology.

acquaintance with pertinent taxonomic literature and use of keys; and understanding of evolutionary principles and concepts and a knowledge of systematic theory and practice. Insect collection required. Spring. Mr. Kurczewski.

*Prerequisites:* F. Ento 500, F. Ento 580.

### 620. AQUATIC ENTOMOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. The biology, ecology, and identification of fresh water insects, with emphasis on the role of aquatic insects in the hydrobiome. Fall. Mr. Brezner.

*Prerequisite:* F Ento 500 or its equivalent.

### 630. INSECT PHYSIOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Study of the life processes in insects; introduction to modern physiological instrumentation and laboratory methods. Spring. Mr. Brezner.

*Prerequisite:* F Biol 330.

### 660. TOXICOLOGY OF INSECTICIDES

*3 credit hours*

Two hours of lecture, three hours of laboratory. The mode and basis of action of various insecticides, phenomena of biotransformation, selectivity, resistance, synergism and dosage-mortality relationships. Spring. Mr. Nakatsugawa.

*Prerequisite:* F Biol 330, or equivalent course in physiology or biochemistry.

### 720. POPULATION DYNAMICS OF FOREST INSECTS

*3 credit hours*

Two hours of lecture, three hours of lab/field work. Interacting environmental factors which influence the relative abundance and distribution of forest insects, ecological principles as applied to problems in forest entomology, and pest management. Introduction to theories of population regulation and the study of the dynamics of forest insect population; individual problem and seminar. Fall. Mr. Allen.

*Prerequisites:* F Ento 500, F Zool 520, or equivalents.

### 796. SPECIAL TOPICS IN FOREST ENTOMOLOGY

*Credit hours arranged according to nature of work*

Special instruction, conference, advanced study and research projects in the fields of insect toxicology, insect physiology, taxonomy of immature insects, phases of biology and ecology of insects. Typewritten report required in some fields. Fall & Spring. Staff.

### 797. SEMINAR

*1 credit hour*

One hour of conference per week. Assigned reports and discussion of topics in entomology. Fall and Spring. Mr. Nakatsugawa and Staff.

### 798. RESEARCH PROBLEMS IN FOREST ENTOMOLOGY

*Credit hours arranged according to nature of problem*

Comprehensive report required in some projects. Fall & Spring. Staff.

### 810. ADVANCED INSECT TAXONOMY

*3 credit hours*

Two hours of lecture, three hours of laboratory. Methods, procedures and concepts of systematics. Examples and material will be drawn from among important groups of forest insects. Fall. Mr. Lanier.

*Prerequisites:* F. Ento 580 and F. Ento 610.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## GENERAL FORESTRY

### 032. ORIENTATION

*No credit*

One hour of lecture and discussion per week designed to introduce the freshman student to the College and its academic and social environs. Fall. Mr. H. Payne and Staff.

100. FOREST RESOURCES AND THE ENVIRONMENT

*3 credit hours*

Three hours of lecture and discussion per week dealing with forest and related resources in relation to national and world needs for forest goods and services. Particular emphasis is placed on forest resources policies, management and use in relation to the environmental concerns of society as viewed today and in the foreseeable future. Fall. Staff.

451. WORLD FORESTRY RESOURCES: PROBLEMS AND PROSPECTS

*3 credit hours*

Three hours of lecture and discussion plus guided readings, pertaining to world forest resources and the problems and opportunities associated with their use and development. Major topics include: world forest resources; production and trade; principal wood-producing countries; forestry and the problems of underdevelopment; and special areas and topics of interest to world forestry. Spring. Mr. Larson and Staff.

*Prerequisite:* Upper division status. Senior status preferred.

502. APPLIED COMMUNICATIONS

*3 credit hours*

Two hours of lecture. Three hours of lab during first part of course. Major media production project required. Course objective is to acquaint students with the basic principles of instructional communications in the teaching-learning process. Various media including television, motion pictures, exhibits, illustrated lectures, slide talks, newspapers, etc. are examined with emphasis on their utilization in environmental education. Also, consideration is given to instructional design for meeting pre-determined learning objectives in various publics—lay and professional adult audiences, school children, etc. Spring. Mr. Hanselman and Staff.

550. RANGE MANAGEMENT

*2 credit hours*

Two hours of lecture, range ecology, animal husbandry, management practices and administrative aspects of range resources. Spring.

751. WORLD FORESTRY

*3 credit hours*

Three hours of lecture and discussion. World forest distribution and types; regional production and consumption of forest products; international trade in timber and related products; the role of forest resources in development; and special topics: tropical forestry, comparative forest policies and programs, forestry education, the problems of developing countries, international cooperation in forestry development, the role of the United States in world forestry, etc. Fall or Spring.

*Prerequisites:* Graduate status.

798. PROBLEMS IN WORLD FORESTRY

*Credit hours to be arranged*

Provides an opportunity for the student to pursue his study of forestry, or some phase thereof, in a global, regional or national (United States and Canada excluded) setting, and to gain experience in original thinking and analytical writing. Fall & Spring. Mr. Larson. For graduate students, primarily, in World Forestry.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## LANDSCAPE ARCHITECTURE

### Graphics

181. GRAPHICS I

*2 credit hours*

Six hours of studio per week. Two three-hour drafting room periods. Elements of perspective, isometric, oblique and orthographic projection. Practical applications of these principles in machine and architectural drawing, including piping, electrical, and plant layouts. Spring.

### 182. ART MEDIA I

*1 credit hour*

Three hours of studio per week. Studios, group instruction and demonstrations, individual critiques, sketching and drawing from model, from still life, and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition, and techniques in various black and white media. Fall.

### 183. ART MEDIA II

*1 credit hour*

Three hours of studio per week. Studio assignments, group instruction, and demonstrations, individual critiques, sketching and drawing from model, from still life, and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition, and techniques in various black and white media. Spring.

### 280. TECHNICAL DRAWING

*1 credit hour*

One three-hour drafting room period. Elements of perspective, isometric, oblique, and orthographic projection. Practice in freehand and instrument drawing. Fall. Mr. Maraviglia.

### 281. LANDSCAPE ARCHITECTURAL DRAFTING

*3 credit hours*

One hour of lecture and six hours of studio per week. Lectures, readings and exercises through studio assignments in graphic techniques, including freehand and instrument drawing, drafting and lettering. Exposure to various graphic media, reproductive processes, axonometric, oblique and orthographic projections. Perspective, architectural, and topographic drawing. Spring.

### 284. ART MEDIA III

*1 credit hour*

Three hours of studio per week. Studios, field trips, group instruction, criticism and demonstration, painting in oil, water color, and acrylics. A studio painting course in oil, watercolor, or acrylics to familiarize and develop color media skills and painting expressiveness. Fall.

*Prerequisite:* Gr 182 or 183 or permission of instructor.

### 285. ART MEDIA IV

*1 credit hour*

Three hours of studio per week. Laboratory-Studios, field trips, group instruction, criticism and demonstration; painting, sculpture, and other three-dimensional media. A studio course in various three-dimensional art forms and painting. Emphasis on individual experimentation and self-expression. Spatial relationships will be studied through the use of the third dimension, both from standpoint of "enclosure" and "setting." Spring.

*Prerequisite:* Gr 182 or 183, or permission of instructor.

### 382. GRAPHICS

*2 credit hours*

One hour of lecture and three hours of studio per week. Lectures, studio problems, and assigned reading. Study of the various graphic and three-dimensional techniques used to simulate the physical environment. Topics include multiview and perspective drawing, shades and shadows, model construction and interpretation. Fall.

*Prerequisite:* One semester of technical drawing or equivalent.

### 383. GRAPHICS

*2 credit hours*

One hour of lecture and three hours of studio per week. Lectures, studio problems, and assigned reading. Study of the various graphic and three dimensional techniques used to simulate the physical environment. Topics include the development of those subject areas introduced in Gr 382, and new areas related to various graphic media, reproduction processes, computer graphics, and techniques of animation. Spring.

*Prerequisite:* Gr 382 or equivalent.

### 580. OIL PAINTING-ACRYLICS

*1 credit hour*

Three hours of studio per week. Informal lectures, discussions, demonstrations, critiques, and individual easel work. Slides, notes, and field trips. Individually programmed painting course for self-expression and familiarization with methods, media, and techniques. Fall & Spring.

*Prerequisite:* Permission of instructor.

## *Environmental Influences*

### 113. INTRODUCTION TO ENVIRONMENTAL STUDIES

*3 credit hours*

Three hours of lecture per week. Lectures, assigned reading, movies, slides, discussion, papers. Discussion of the total spectrum of the physical environment; what man has done to adapt, alter, and influence the environment in which he lives. Comparison of the environmental concerns and influences of African, Oriental, and Western civilizations. Course will focus on environmental forms, uses, and problems, with special concern for the professions, sciences and arts which deal directly with the environment. Spring.

### 211. GENERAL GEOGRAPHY

*3 credit hours*

Three hours of lectures, assigned readings, written reports per week. Discussion of basic geographic concepts and methods, explanation of the significance of man-land relationships as exemplified through the regional distribution and spatial patterns of natural and cultural features, description of geologic processes and other physical features such as soils, climates and natural vegetation. Not open to geography or geology majors. Spring.

### 311. PRINCIPLES OF LAND USE

*3 credit hours*

Three hours of lecture, reports, assigned readings per week. Explanation of factors which influence the use, development, and control of land. Discussion of government's role in land development and control. Detailed consideration of unique values of land, competition for the use of space, planning for better land use, introduction to planning concepts and techniques, and other topics. Spring.

### 411. SOCIO-CULTURAL IMPACTS ON ENVIRONMENTAL DESIGN

*3 credit hours*

Three-hour lecture per week. Investigation and discussion of the social, cultural, economic, and political facets of a given foreign country as they effect the philosophy and practices of environmental design and landscape architecture. Bilingual readings, lectures, and discussions. Spring.

*Prerequisite:* 4th-year status and registration in the School of Landscape Architecture Foreign Semester Program.

### 470. ART HISTORY

*3 credit hours*

Three hours of lecture per week. Informal lectures and class discussion will emphasize and review assigned text and other readings and handout notes. Slides will be shown regularly, notebooks, reports, quizzes, and examinations. Evolutionary nature of the main cultural periods of Western man and fine art as man's selected environment will be the course emphasis. Fall.

### 471. HISTORY OF LANDSCAPE ARCHITECTURE

*3 credit hours*

Three hours of lecture per week. Informal lectures, and class discussion, notebooks, reports, assigned text, and assigned reserve shelf reading, optional text, and handout notes, weekly quizzes and exams. Slides. Historical study and style analysis of Western man's efforts to design his environment and his changing attitudes and relationships to environment. Also, non-Western coverage where significant or influential on Western Man. Study of historical personalities as well as periods that are of environmental concern up into the modern period. Spring.

*Prerequisites:* E I 470, or equivalent. History of Arts course.

### 550. FUNDAMENTALS OF CITY AND REGIONAL PLANNING

*3 credit hours*

Three hours of lectures, assigned readings, written reports per week. Discussion of the meaning and purposes of city and regional planning. Examination of the historical development of urban places. Explanation of the principal elements of the comprehensive planning process, including goal formulation and decision making, social and advocacy planning, planning for community facilities, and planning administration. Discussion of the methods and objectives of city and regional planning. Fall.

*Prerequisites:* 5th year status or permission of instructor.

## Landscape Architecture

### 310. ELEMENTS OF LANDSCAPE ARCHITECTURE AND ENVIRONMENTAL DESIGN FOR ARCHITECTURE STUDENTS

*2 credit hours*

Two hours of lectures, discussions and assigned readings per week. A successive presentation of a landscape architectural philosophy toward the physical environment and environmental design. Presentation of operational systems involved in the physical environment from technical, functional and symbolic points of view. Fall.

*Prerequisite:* Enrollment in School of Architecture or permission of instructor.

### 311. ELEMENTS OF LANDSCAPE ARCHITECTURAL PRACTICE FOR ARCHITECTURE STUDENTS

*2 credit hours*

Two hours of lectures, problems, and assigned readings per week. An introduction to the design elements of Landscape Architecture in contemporary application and practice. Spring.

*Prerequisites:* L A 310; enrollment in School of Architecture or permission of instructor.

### 322. BASIC DESIGN

*2 credit hours*

One hour of lecture and three hours of lab per week. Lectures, studios, criticism, quizzes, exams, reports, composing and rendering finished abstract design plates and constructions. Course presents a theory of abstract design applicable to all graphic arts, and offers studio time in which to apply theory to graphic problems. Presented are the mechanics of design, design terminology, a basis of design criticism, and experience in basic design. Fall.

### 324. INTRODUCTION TO LANDSCAPE ARCHITECTURE

*3 credit hours*

Three hours of lecture per week. Lecture, and class discussion, notebooks, reports, assigned text reading and assigned reserve shelf reading, research reading, weekly quizzes and exams, slides, movies, and guest lectures, field trips. Course describes the field of Landscape Architecture, its background, philosophy, interdisciplinary relationships, its spectrum of interest, the human needs it responds to. It is not a course in design or design theory but in the background basis for landscape design. Fall.

### 325. LANDSCAPE DESIGN STUDIO I

*2 credit hours*

Six hours of studio per week. Studio assignments, drafting, readings, discussion, and field trips. An introduction to the visual-mental concepts basic to landscape architectural design. Various abstract problems to illustrate elements of the physical environment and their effect upon man. Special attention to the spatial context of these elements and spatial sequences characteristic of the natural and man-made environments. Spring.

*Prerequisites:* L A 324, L A 322, or permission of instructor.

*Note:* Student field trip expense $125–$150.

### 333. PLANT MATERIALS

*3 credit hours*

Three weeks of field trips and discussion during Summer Session. Ornamental woody plant identification. Observation and sketches of outstanding examples of planting design. Summer.

*Prerequisites:* F Bot 100, F Bot 210, and L A 322.

### 343. STRUCTURAL MATERIALS AND ELEMENTS

*3 credit hours*

Three hours of lectures, problems and assigned reading per week. Study of the physical properties of materials and structural elements commonly used in landscape architecture. Topics include elementary statics and strength of materials, wood, metal, plastics, concrete, masonry, retaining walls, dams, foundations. Spring.

### 345. ELEMENTS OF SITE ENGINEERING

*3 credit hours*

Two hours of lectures and three hours of studio per week. Lectures, problems, drafting, modeling, and assigned reading. The study of land form and its technical expression through grading plans, sections, profiles, layout plans, and earthwork quantity computation. Principles of soil mechanics and land drainage and their application to surface and subsurface drainage systems. Spring.

*Prerequisites:* F M 201 and E I 211.

### 420. LANDSCAPE DESIGN THEORY I

*2 credit hours*

Two hours of lectures, discussions, critiques, and assigned readings per week. A successive presentation of data on the physical environment beginning with the macroscape of nature to the intensively humanized urban site. Principles of basic organization of land areas, composition of elements, analysis of sites and programs, the process, purpose and implication of the practice of design. Fall and Spring.

*Prerequisite:* 4th year status or permission of instructor.

### 421. LANDSCAPE DESIGN THEORY II

*2 credit hours*

Two hours of lectures, discussions, critiques, and assigned readings per week. A successive presentation of data on the physical environment beginning with the macrospace of nature to the intensively humanized urban site. Principles of basic organization of land areas, composition of elements, analysis of sites and programs, the process, purpose and implication of the practice of design. Spring.

*Prerequisites:* L A 420 or permission of instructor.

### 422. LANDSCAPE DESIGN STUDIO II

*4 credit hours*

Twelve hours of studio per week. Studio problems, research, drafting, and field trips. The processes and methods of design considerations of variances upon the natural physical environment, ranging from broad regional areas to specific site concerns. Fall.

*Prerequisites:* L A 324, 325, 322, GR 382, 383, or permission of instructor.

### 423. LANDSCAPE DESIGN STUDIO III

*4 credit hours*

Twelve hours of studio per week. Studio problems, research, and drafting. Interaction of cultural influences with the physical environment, with attention focusing on the resulting forms. Observations and illustrations of people and places as inputs into the design process. Spring.

*Prerequisites:* L A 422 or permission of instructor.

### 430. PLANT MATERIALS CULTURE

*3 credit hours*

Three hours of field study and lectures per week. Trees, shrubs, vines and grasses. Identification; culture; common practices in pest and disease control. Fall.

*Prerequisite:* L A 333.

### 440. SITE DEVELOPMENT SYSTEMS

*3 credit hours*

Three hours of lectures, problems and assigned reading per week. Study of various engineering systems as they relate to the design and development of land. Topics include pedestrian ways, utilities (water, solid waste, sewage, electric, gas), road location and design, shore protection, swimming pools. Fall.

*Prerequisite:* Surveying.

### 463. ARCHITECTURE I

*3 credit hours*

One hour of lecture, six hours of studio per week. Introduction to the principles of architectural design and their application to project solutions. Traditional and contemporary structural systems and their effect on architectural form. Studio projects range from minor architectural elements associated with site design to more complex buildings. Practice in preparation of architectural drawings from preliminary design to working drawings. Spring.

*Prerequisites:* L A 343, 440, 420 and 422, or permission of instructor.

### 495. SELECTED READINGS IN ENVIRONMENTAL STUDIES

*1–3 credit hours*

Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Session. Staff.

*Prerequisites:* Permission of instructor.

### 498. INTRODUCTORY RESEARCH PROBLEM

*1 credit hour*

Guided study of a selection of problems relating to landscape architecture and environmental design. Emphasis on study procedure and methods employed. Fall and Spring. Staff. Enrollment at periodic intervals throughout the semester.

*Prerequisite:* Permission of instructor.

### 522. LANDSCAPE DESIGN STUDIO IV

*4 credit hours*

Twelve hours of studio per week. Studio problems, research, drafting, and field trips. Concentration on complex urban problems. Concern for social and psychological considerations of the individual and large groups of people, their interaction and resultant forms of the environment. Fall.

*Prerequisites:* L A 423 or permission of instructor.

*Note:* Student's expenses on an extended field trip approximately $125 to $150.

### 525. LANDSCAPE DESIGN STUDIO V

*4 credit hours*

Twelve hours of studio per week. Investigation of a problem in landscape architecture as proposed by the student and conducted in conjunction with faculty advisor. Spring.

*Prerequisite:* L A 522 or permission of instructor.

### 527. LANDSCAPE DESIGN STUDIO V

*4 credit hours*

Twelve hours studio per week. Studio problems, research, reports, and field trips. Concentration on regional landscape problems, the techniques of their analysis and derivation of their significance to the practice of landscape design. Spring. Design staff plus consultants.

*Prerequisite:* LA 522 or permission of instructor.

### 530. HERBACEOUS PLANT MATERIALS

*2 credit hours*

Two hours of lectures, study problems, assigned readings and field trips per week. Identification, understanding, and design use of non-woody plants. Fall.

*Prerequisite:* Permission of instructor.

### 532. WOODY PLANT MATERIALS

*3 credit hours*

Three hours of lecture per week. Field study, lectures, slide presentations and readings. An elective course providing opportunity for extension of basic knowledge in the identification and design of woody plant materials in professional practice. Fall or Spring.

*Prerequisites:* L A 333 and L A 430 or permission of instructor.

### 542. HIGHWAY LOCATION AND DESIGN

*3 credit hours*

Two hours of lecture, three hours of studio per week. Lectures, assigned reading, studio projects, field trips. Environmental, engineering and human factors which determine highway location and design, particularly as they relate to landscape architectural concerns. Location, alignment, geometric design, drainage, roadbed construction, pavements, roadside development. Fall or Spring.

*Prerequisites:* L A 343, 440 and 540, or permission of instructor.

### 544. PROFESSIONAL PRACTICE STUDIO I

*1 credit hour*

Three hours of studio per week. Studio problems, research, discussion on the processes and methods of office practice. Emphasis on architectural form and site structure relationships. Fall.

*Prerequisites:* 5th year status or permission of instructor.

### 545. PROFESSIONAL PRACTICE STUDIO II

*2 credit hours*

Three hours of studio, one hour of recitation per week. Studio problems, research, discussion and recitation sessions on the processes and methods of office practice. Emphasis on all aspects of site development. Spring.

*Prerequisites:* L A 544 or permission of instructor.

### 547. PRINCIPLES OF PROFESSIONAL PRACTICE

*2 credit hours*

Two hours of lecture per week. Lectures, assigned readings, reports, cost estimates, specifications, contracts, professional ethics, registration laws, professional practice. Spring.

*Prerequisite:* Upperclass standing.

### 561. ECOLOGICAL ARCHITECTURE

*3 credit hours*

One hour of seminar, six hours of studio per week. Study of special relationships of architectural form to predominantly natural environments, particularly parks and other recreation areas. A variety of studio projects involving program preparation, preliminary design and detailed drawings. Spring.

*Prerequisite:* L A 560 or permission of instructor.

### 562. ARCHITECTURE II

*2 credit hours*

Two hours of lecture per week. Discussion of the principles of architectural design and procedures of architectural practice. Functional building systems, coupled with site and program considerations as to their relative impacts on architectural form. Fall.

*Prerequisite:* L A 463 or permission of instructor.

### 595. SELECTED READINGS IN LANDSCAPE ARCHITECTURE

*1–3 credit hours*

Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer session. Staff.

*Prerequisites:* 5th year graduate status or permission of instructor.

### 597. LANDSCAPE ARCHITECTURE SEMINAR

*2 credit hours*

Two hours of seminar per week. Discussion of current social, political, cultural and technological problems as to their relationship to the physical environment. Fall and Spring.

*Prerequisite:* Permission of instructor.

### 598. RESEARCH PROBLEM

*1–3 credit hours*

Independent study of selected areas of environmental interest. Emphasis on a self-disciplined study, development of procedures and techniques to be employed in environmental design and planning. Engagement with specific sites and problems as proposed for study by individual communities. Fall and Spring. Enrollment at periodic intervals throughout the semester. Staff.

*Prerequisite:* Permission of instructor.

### 697. SEMINAR—DESIGN AND PLANNING IN THE PHYSICAL ENVIRONMENT

*2 credit hours*

Discussion of assigned topics selected to acquaint the entering graduate student with a generalized view of the motivation and procedures of environmental design and planning. Fall and Spring. Staff.

*Prerequisite:* Graduate status.

### 720. LANDSCAPE DESIGN V

*4 credit hours*

Development of a major landscape design problem involving preparation of a series of related drawings. Fall. Staff.

*Prerequisites:* L A 522, L A 525, or permission of instructor.

### 721. LANDSCAPE DESIGN VI

*4 credit hours*

Continuation as described above. Further advanced project design similar to the work of L A 720. Spring. Staff.

### 730. PLANT MATERIALS IV

*2 credit hours*

Lecture, field work, trips. Special study of woody and herbaceous plant materials, greenhouse operation, and other horticultural practices. Spring. Mr. Viertel, Staff, and visiting lecturers.

### 731. PLANT MATERIALS

*3 credit hours*

Seminars, individual conferences, field trips, readings. Guided individual study in aspects of plant materials related to landscape architecture. Fall or Spring. Mr. Viertel.

*Prerequisite:* L A 730 or permission of instructor.

### 740. LANDSCAPE ARCHITECTURAL CONSTRUCTION

*3 credit hours*

Lectures, drafting. Detailed study of special landscape construction problems. Preparation of estimates, contracts, and specifications. Fall. Mr. Sears and Staff.

*Prerequisite:* L A 542.

### 750. CITY PLANNING

*3 credit hours*

Lectures, reports, assigned readings, and design. Architectural, aesthetic and engineering principles. One typewritten report (original and four carbons) required. Fall.

*Prerequisites:* L A 522, L A 525.

### 797. SEMINAR

*2 credit hours*

Discussion of miscellaneous current problems related to planning and management. Fall or Spring. Staff and visiting lecturers.

### 798. RESEARCH PROBLEM

*Credit hours arranged according to nature of problem*

Special study of assigned problems relating to landscape architecture or planning, with emphasis on critical thinking. Fall & Spring. Staff.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

## MANAGEMENT (FOREST MANAGEMENT)*

### 201. PLANE SURVEYING

*3 credit hours*

Two hours of lecture and recitation, three hours of field or office practice. A comprehensive development of the theoretical principles of plane surveying. Use of modern instruments and methods, computations related to forest activities. Fall. Staff.

*Prerequisite:* Plane Trigonometry.

### 303. INTRODUCTION TO FOREST MEASUREMENTS (SUMMER FIELD SESSION)

*1 credit hour*

Introduction to the concepts and practices of elementary field measurements necessary to forest survey and stand data preparation.

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*See also listings for Forest Engineering.

Emphasis is given to field procedures, methods, and instruments, and to recognition of need for standards of performance. Summer Session. Staff.

### 310. ROADS

*3 credit hours*

Two hours of lecture, three hours of field and laboratory practice. Engineering principles in the planning, location, design, construction, and maintenance of forest roads. Contract specifications, costs, drainage, typical sections, grades, curves, surfacing materials, use of heavy equipment, and explosives. Principles in the location, installation, and maintenance of communications. Spring. Mr. Koten.

*Prerequisite:* F Mgt 201 or F Engr 301.

### 340. HARVESTING

*2 credit hours*

Two hours of lecture. Principles of harvesting primary forest products. Equipment, methods, and economics of the logging industry. Spring. Mr. Koten.

### 497. FOREST MANAGEMENT SEMINAR

*3 credit hours*

Three hours of group discussion and analysis. Current literature, plans, and principles, and new developments in forest management. Fall. Staff.

### 498. PROBLEMS IN FOREST MANAGEMENT

*1 to 3 credit hours*

Independent study in special problems in Forest Management. The selection of a subject area will be determined by the student and an appropriate faculty member designated by the Department Chairman. A final written report is required for department records. Fall and Spring. Staff.

*Prerequisites:* Senior standing in Resources Management and permission of instructor.

### 522. MENSURATION

*3 credit hours*

Two hours lecture and discussion, one three-hour laboratory. Principles and methods of estimating and projecting net volumes of trees and products; tree form; timber volume determination of logs, trees and stands; growth determination; analyses by graphical and mathematical methods; stand structure adjustments; numerous problems. Spring. Mr. Cunia & Mr. Sullivan.

*Prerequisites:* AM 571 or AM 591; F Mgt 201 or F Engr 301.

### 530. FOREST MANAGEMENT

*4 credit hours*

Three hours of lecture supplemented by one hour of discussion and/or lecture. Public and private forest policy formation; principles of modern management; over-all management and operation of a productive forest property. Primarily for forest engineers. Not available to Resource Management undergraduates. Spring or Fall. Mr. Koten.

*Prerequisites:* Mensuration and Silviculture or by permission of the instructor.

### 540. ANALYSIS AND CONTROL OF FORESTRY OPERATIONS

*3 credit hours*

Two hours of lecture, three hours lab. Applications of scientific methods to management decision problems of forestry operations with emphasis on data sources and reliability, model formulation, inventory control, equipment replacement, simulation, and critical path scheduling and costing. Fall. Mr. Koten.

*Prerequisites:* AM 571 or equivalent, F Mgt 340 and computer programming.

### 552. MANAGEMENT PLANNING AND OPERATIONS

*3 credit hours*

Three hours of lecture and recitation. The over-all management and operation of a forest property as a productive enterprise, particularly development and expediting of cutting budgets, work plans, and operating schedules. Emphasis is on integration of principles and concepts of mensuration, silviculture, utilization, engineering, economics, administration, and human relations in the context of a practical operating land ownership. Spring. Mr. Horn.

### 554. FOREST ADMINISTRATION AND POLICY

*3 credit hours*

Three hours of lecture and recitation. Administrative and executive aspects of forestry. Public and private forest policy formulation; basic principles of organization, planning, public relations, personnel management, budget, and administrative practice. Work and organization of the major agencies engaged in forestry. Fall. Mr. Getty.

### 556. MANAGEMENT OF THE FOREST BUSINESS

*3 credit hours*

Three hours of discussion. Overview of major business management principles and methods of operation in forestry enterprises. Emphasis is on general business concepts which forest managers must use. Actual case studies are basis of instruction. Complementary to F Econ 511. Fall or Spring. Mr. Horn.

### 558. THE LAW OF NATURAL RESOURCE ADMINISTRATION

*3 credit hours*

Three hours of lecture-discussion. An introduction to the law concerning the procedures, powers, and judicial review of public agencies responsible for the management of natural resources. Topics will include the extent of an agency's rule-making power and the rights of aggrieved parties to appeal from agency decisions. Spring. Mr. Horn.

*Prerequisites:* F Mgt 554 or equivalent course in public administration.

### 560. MANAGEMENT PRINCIPLES AND PROCESSES

*3 credit hours*

Three hours of lecture. The principles of the art of managing manpower, providing greater depth in the concepts of management covered in F M 554. Network analysis methods of management planning. Evaluation of personnel. Human relations concepts. The processes of problem recognition and decision making, with consideration of the philosophical and qualitative elements of management science and information theory and their implications. Spring. Staff.

*Prerequisite:* F M 554 or permission of instructor.

### 561. OPERATION COST CONTROL

*3 credit hours*

Three hours lecture. Management uses of accounting data. Essentials of cost accounting and the uses and misuses of historical cost data in management decision making. Concepts of financial analysis of past and projected cash flows, and various methods of comparing alternatives. Fall and Spring. Mr. Palmer.

*Prerequisite:* Permission of instructor.

### 562. THE STRUCTURE OF MANAGEMENT DECISIONS

*3 credit hours*

Three hours of lecture. Introductory course in managerial decision making. Covers theory, concepts, and methodology of management practices and relates these to the realities of decision making. Uses the problem solving approach in preparing the prospective resource manager or administrator for an understanding of the application of decision-making models. Spring. Staff.

*Prerequisites:* F M 554 and A M 571 or equivalent and permission of instructor.

### 572. PRINCIPLES OF OUTDOOR RECREATION

*3 credit hours*

Three hours of lecture per week. Lectures, assigned readings, oral reports. Discussion of the importance of outdoor recreation in modern society and factors which contribute to the need for outdoor recreation. Description of types of recreational facilities and the organizations which provide them. Explanation of economic, social and political relationships in outdoor recreation. Fall. Mr. D. Morrison.

*Prerequisites:* Fourth year status or permission of instructor.

### 575. SOCIOLOGY OF OUTDOOR RECREATION

*3 credit hours*

Two hours lecture, three hours lab. Introduction to theory and research findings dealing with the sociological aspects of outdoor recreation: field work and lectures suggest administrative applications. Spring. Mr. D. Morrison.

*Prerequisite:* An introductory course in sociology or psychology; instructor's permission.

### 710. RESEARCH METHODS

*3 credit hours*

Instruction regarding methodology in the approach to and solution of problems in

Forest Management research. Restricted to graduate students in Forest Management. Spring. Staff.

### 720. ADVANCED MENSURATION

*3 credit hours*

Systematic, stratified, and cluster sampling. Photo interpretation and double sampling. Ratio, Regression, and 3P Sampling estimates. Continuous Forest Inventory (CFI) and Sampling with Partial Replacement (SPR). Matrix Algebra applications to Multiple Regression and Weighted Least Square Method. Contribution of the error in Volume Tables to the error in the final average volume estimates. Forest Inventory and its place in the Woodlands decision-making. Optimum allocation of resources to sampling trees and plots in management inventory. Fall. Mr. Cunia.

*Prerequisites:* F Mgt 522, A M 360, A M 591, A M 595.

### 752. APPLIED FOREST MANAGEMENT

*3 credit hours*

Principles and practices of forest management as applied to specific forest properties under the guidance of responsible public and private foresters. Several days are spent in the field studying forest conditions, organizations, operations, and problems. By observing actual forest operations, students become acquainted with the latest and most efficient forest practices in office and forest. Fall. Mr. Horn.

### 754. ADVANCED FOREST ADMINISTRATION

*3 credit hours*

Critical appraisal of existing public, semi-public and private forestry agencies in the United States, and the comparative study of major administrative organizations and practices. Occasional inspection trips to forestry headquarters and field units and discussion of internal administrative problems with forest officers. Spring. Mr. Getty.

*Prerequisite:* F Mgt 554 or equivalent.

### 756. MANAGEMENT CONCEPTS IN PLANNING FOREST PRODUCTION

*3 credit hours*

Three hours of lecture-discussion. The theories and principles involved in planning the annual allowable cut and the resulting yearly cutting schedules. The influence of technical decision and socio-economic pressures upon the level of cutting and the effect of the level of cutting upon the dependent industry. Fall or Spring. Mr. Koten.

*Prerequisite:* F Mgt 552 or equivalent.

### 797. SEMINAR

*1 credit hour*

Group discussion and individual conference concerning current topics, trends, and research in management. Fall & Spring. Staff.

### 798. FOREST MANAGEMENT PROBLEMS

*Credit hours arranged according to nature of problem*

Hours to be arranged. Special study of assigned problems with emphasis on critical thinking. One typewritten report (original and one carbon) required. Fall & Spring. Staff.

### 851. OPERATIONS RESEARCH I

*3 credit hours*

Three hours of lecture. Mathematical methods applicable to the managerial process. The nature of mathematical modeling. Deterministic and statistical models. Stochastic processes, simulation, inventory control and queuing theory. Fall. Mr. Cunia.

*Prerequisites:* A M 591 or equivalent and Math 227 or equivalent.

### 852. OPERATIONS RESEARCH II

*3 credit hours*

Three hours of lecture. Continuation of F Mgt 851. Linear, quadratic and dynamic programming. Allocation and transportation problems. Game theory, competitive strategies and other operations research methods. Spring. (NOTE: Offered in Fall in 1971–72) Mr. Cunia.

*Prerequisite:* F Mgt 851.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## MATHEMATICS (COLLEGE OF FORESTY COURSES)

115. PLANE TRIGONOMETRY

*3 credit hours*

Three hours of lecture. The course includes: the six trigonometric functions, the radian measure of angles, the variation and graphs of the trigonometric functions, the solution of right triangles and applications, trigonometric identities, trigonometric equations, inverse trigonometric functions, the general triangle, complex numbers, logarithms, and accuracy of computed results. Fall or Spring. Mr. Green.

116. COLLEGE ALGEBRA

*3 credit hours*

Three hours of lecture. The course includes a review of the axioms of algebra, the algebraic operations, inequalities, functions and their graphical representation, linear and quadratic functions, determinants, theory of equations, inverse functions, permutations, combinations and probability, the Binomial Theorem, mathematical induction, exponential and logarithmic functions and complex numbers. Fall or Spring. Mr. Green.

## PAPER SCIENCE AND ENGINEERING

300. INTRODUCTION TO THE PULP AND PAPER INDUSTRY

*1 credit hour*

Discussion of the historical modern development and management of the paper industry. Fall. Mr. O'Neil.

301. PULP AND PAPER PROCESSES

*3 credit hours*

Three hours of lecture. Introduction to pulp and paper technology with emphasis on pulping and bleaching. A study of the processes of pulping and bleaching of fibers including underlying theory. An introduction to formation and reactions of a fibrous web. Spring. Mr. Bambacht.

*Prerequisites:* Chem 332, F Chem 575 & 576.

302. PAPER PROCESSES LABORATORY

*1 credit hour*

One three-hour lab. Study and practice in the techniques of lab procedures normally encountered in the pulp and paper industry. Lab exercises selecting and using standard testing methods. Field trips to observe commercial equipment of the pulp and paper industry. Spring. Mr. Bambacht.

*Prerequisite:* PSE 301 (or concurrent).

304. MILL EXPERIENCE

*5 credit hours*

Twelve weeks full-time pulp or paper mill employment approved by the Department between the junior and senior years. Ordinarily, the student receives wages or salary while getting the required experience. The student must submit a comprehensive report to fulfill this requirement. An adaptability rating chart furnished by the Department is prepared by the mill for each student employed. Staff.

305. MILL INSPECTION REPORT

*1 credit hour*

One week inspection trip to representative manufacturers of pulp and paper, papermaking equipment, plastics, chemicals, or related products selected for demonstrating typical plant scale operations. Ultimate emphasis is on manufacture of pulp and paper. Daily discussions. Typewritten report required on termination of trip. Trip expenses are approximately $60 per student. Spring. Staff.

*Prerequisites or concurrent:* PSE 301, PSE 302, PSE 570, PSE 571, & PSE 573.

496. SPECIAL TOPICS

*1–3 credit hours*

Lectures, conferences, and discussions. Specialized topics in chemistry, chemical engineering and physics as well as topics pertaining to management as related to the pulp, paper, paperboard and allied industries. Spring. Staff.

498. RESEARCH PROBLEM

*4 credit hours*

Twelve hours lab. The student is assigned a research problem in pulping, bleaching, refining, additives, quality control of paper or paper products or chemical engineering. The student must make a systematic survey of available literature on the assigned problem. Emphasis is on application of correct research technique rather than on discovery of results of commercial importance. The information obtained in the literature survey along with the data developed as a result of the investigation is assembled and evaluated and submitted in duplicate to his instructor. Spring. Staff.

*Prerequisites:* PSE 561, PSE 565.

### 556. ECONOMICS OF PULP AND PAPER

*2 or 3 credit hours*

Two or three hours of lecture and seminar. Structure and development of the industry and the decisions of management are explained in the light of economic principles. Current industrial trends and problems are discussed. Each student prepares an analytical report on some aspect of industry structure. Spring. Mr. Armstrong.

*Prerequisite:* F Econ 290 or equivalent.

### 561. PULPING TECHNOLOGY

*4 credit hours*

Two hours of lecture and six hours of lab. Discussion of pulping and bleaching processes: Effect of chemicals and physical variables on the wood components and pulp properties; chemistry involved. Experiments in pulping and bleaching, and pulp evaluation. Fall. Mr. Gorbatsevich.

*Prerequisites:* PSE 570, Chem 346 and Chem 356.

*Note:* A student may not enroll in or receive credit for both PSE 561 and PSE 661.

### 565. PAPER PROPERTIES

*5 credit hours*

Three hours of lecture, six hours of lab and discussion. Evaluation and study of the physical, optical, and chemical properties of paper and the interrelationships existing between paper manufacturing methods, papermaking additives, test results, and the ultimate properties desired in the finished paper. Fall. Mr. Strauss.

*Prerequisites:* PSE 301, PSE 302.

*Note:* A student may not enroll in or receive credit for both PSE 565 and PSE 665.

### 566. PAPER COATING

*3 credit hours*

Two hours of lecture, three hours of lab. Evaluation and study of the various coating processes and materials used by the paper industry to impart special properties to paper. Relationships of various components, flow properties of coating mixtures, and evaluation of their effect on coated paper properties will be studied. Spring. Mr. Strauss.

*Prerequisite:* PSE 565.

*Note:* A student may not enroll in or receive credit for both PSE 566 and PSE 666.

### 568. PAPERMAKING PROCESSES

*3 credit hours*

One hour of lecture, six hours of lab. Laboratory study of the papermaking process, with emphasis on operation of the semi-commercial Fourdrinier paper machine. Emphasis is on the fundamentals of stock preparation, paper machine operation, evaluation of the finished product, and the collection and analysis of data to develop material and energy balance. Results of each paper machine run are evaluated in seminar-type discussions. Spring. Messrs. Strauss, Gorbatsevich, & Stenuf.

*Prerequisites:* PSE 561, PSE 565, PSE 571.

### 570. PRINCIPLES OF MASS AND ENERGY BALANCE

*3 credit hours*

Three hours of lecture. Study of the properties of steam and solving problems connected with material and energy balances. Spring. Mr. Gorbatsevich.

*Prerequisites or concurrent:* Math 227, Physics, Chem 346, Chem 356, & Chem 333.

### 571. PULP AND PAPER UNIT OPERATIONS I

*3 credit hours*

Three hours of lectures. The study of momentum, heat and mass transfer as applied to the design and operation of equipment for fluid flow, heat transfer, evaporation, humidity and air-conditioning. Emphasis is on the application of the fundamentals of these processes to the manufacture of pulp and paper. Fall. Mr. Stenuf.

*Prerequisite:* Chem 346, Chem 356.

### 572. PULP AND PAPER UNIT OPERATIONS LABORATORY I

*1 credit hour*

Three hours of lab. Lab study of fluid dynamics, heat transfer and evaporation. Emphasis is placed on the recognition of the important variables and on methods of evaluating them by experimentation and subsequent calculations. Specially designed semi-commercial equipment is used. Fall. Mr. Stenuf.

*Concurrent:* PSE 571.

### 573. PULP AND PAPER UNIT OPERATIONS II

*3 credit hours*

Three hours of lecture. The study of momentum, heat and mass transfer as applied to the design and operation of equipment for sedimentation, filtration, drying, gas absorption, distillation and extraction. Emphasis is on the application of the fundamentals of these processes to the manufacture of pulp and paper. Spring. Mr. Stenuf.

*Prerequisites:* Chem 346, Chem 356, & PSE 571.

### 574. PULP AND PAPER UNIT OPERATIONS LABORATORY II

*3 credit hours*

Nine hours of lab. Lab study of humidity and air conditioning, drying, extraction, distillation, gas absorption, filtration, sedimentation, mixing, and other unit operations. Emphasis is placed on the recognition of the important variables and on methods of evaluating them by experimentation and subsequent calculation. Specially designed semi-commercial equipment is used. Spring. Mr. Stenuf.

*Concurrent:* PSE 573.

### 575. UNIT OPERATIONS I: FLUID MECHANICS AND HEAT TRANSFER

*3 credit hours*

Three hours of lecture and four hours of recitation per week for first 9 weeks of the semester. The study of momentum and heat transfer. Pipeline and duct design, pump and blower selection, flow measurement, open channel flow, heat transfer by conduction, convection, radiation, including equipment design and selection. Fall. Mr. Stenuf.

*Prerequisites:* F Chem 221 and 223, Chem 106, 116, 346, 356, Phys 103, 104, PSE 300, 301, 570 or equivalents.

### 576. UNIT OPERATIONS II: PROCESS CONTROL AND MASS TRANSFER

*2 credit hours*

Two hours of lecture and four hours of recitation per week for the last 6 weeks of the semester. The study and application of measuring means, remote signal transmission, and control elements. Response to signals, lag, dynamic error, cycling and other phenomena of process control are discussed in relation to the standard modes of control, including two-position, single-speed floating, proportional, proportional-speed floating, proportional-reset, proportional-reset-rate, cascade control, relation of the process variables to open and closed loop computer applications.

The fundamentals of mass transfer, humidification and air conditioning as applied to industry and as found in the environment—climate and weather conditions. Fall. Mr. Stenuf.

*Prerequisite:* PSE 575.

### 577. PROCESS CONTROL FOR THE PAPER INDUSTRY

*3 credit hours*

Three hours of lecture. The study and application of measuring means, remote signal transmissions, and control elements. Response to signals, lag, dynamic error, cycling and other process control phenomena. The use of electronic computers in the paper industry. Applications of these principles and instruments to pulp and paper industry is stressed. Fall or Spring. Mr. Stenuf.

*Prerequisites or concurrent:* PSE 301, PSE 302, PSE 571, PSE 573, Chem 346, & Chem 356.

### 578. UNIT OPERATIONS III: MASS TRANSFER

*3 credit hours*

Three hours of lecture and four hours of recitation per week for the first 9 weeks of the semester. The study of mass transfer and application to the design and operation of equipment for drying, gas absorption, distillation and extraction. Each operation is treated as a practical unit complete with application of heat transfer, fluid flow, thermodynamics and instrumentation. Spring. Mr. Stenuf.

*Prerequisite:* PSE 576.

### 579. UNIT OPERATIONS IV: RECOVERY PROCESSES OPERATIONS

*2 credit hours*

Three hours of lecture and four hours of recitation per week for the last 6 weeks of the semester. The study of industrial recovery processes operations including evaporation, filtration, sedimentation, centrifugation, small particle technology and fluidization, and reverse osmosis. Each operation is treated as a practical unit complete with application of heat transfer, fluid flow, thermodynamics and instrumentation. Spring. Mr. Stenuf.

*Prerequisite:* PSE 576.

### 661. PULPING TECHNOLOGY

*4 credit hours*

Two hours of lecture and six hours of laboratory. Discussion of pulping and bleaching processes. Effects of chemicals and physical variables on the wood components and pulp properties; chemistry involved. Experiments in pulping and bleaching, and pulp evaluaion. Fall. Mr. Gorbatsevich.

*Prerequisite:* PSE 570, Chem 346 and Chem 356.

*Note:* A student may not enroll in or receive credit for both PSE 561 and PSE 661.

### 665. PAPER PROPERTIES

*5 credit hours*

Three hours of lecture, six hours of lab and discussion. Evaluation and study of the physical, optical, and chemical properties of paper and the interrelationships existing between paper manufacturing methods, papermaking additives, test results, and the ultimate properties desired in the finished paper. Fall. Mr. Strauss.

*Note:* A student may not enroll in or receive credit for both PSE 565 and PSE 665.

### 666. PAPER COATING

*3 credit hours*

Two hours of lecture, three hours of laboratory. Evaluation and study of the various coating processes and materials used by the paper industry to impart special properties to paper. Relationships of various components, flow properties of coating mixtures, and evaluation of their effect on coated paper properties will be studied. Spring. Mr. Strauss.

*Note:* A student may not enroll in or receive credit for both PSE 566 and PSE 666.

### 775. INDUSTRIAL THERMODYNAMICS

*3 credit hours*

The study and application of thermodynamics, including the first and second law, phase relationships, thermochemistry, the production of work and equilibrium relationships. Fall. Mr. Stenuf. Course given in even calendar years.

*Prerequisites:* Chem 346, Chem 356, or equivalent.

### 778. METALLURGY AND CORROSION FOR THE PAPER INDUSTRY

*3 credit hours*

Three hours of lecture. The study and application of metallurgy and corrosion for the Pulp and Paper Industries. Fall. Mr. Stenuf. Course given in odd calendar years.

*Prerequisites:* Chem 346, Chem 356, or equivalent.

### 796. SPECIAL TOPICS

*1 to 3 credit hours*

Lectures, conferences, and discussions. Advanced topics in chemical engineering, chemistry and physics as related to fibers, pulps and paper. Fall & Spring. Staff.

### 797. SEMINAR

*1 credit hour*

Discussions of assigned topics in fields related to pulp and paper technology. Fall & Spring. Staff.

### 798. RESEARCH IN PULP AND PAPER TECHNOLOGY

*Credit hours arranged according to nature of problem*

Hours to be arranged. Problems in pulp and paper technology are assigned to properly qualified graduate students. One typewritten report (original and one carbon) required. Fall & Spring. Staff.

Prerequisites depend upon nature of problem.

899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## RESOURCES MANAGEMENT

304. SILVICULTURE—RESOURCE MANAGEMENT (SUMMER FIELD SESSION)

*3 credit hours*

Field exercises designed to illustrate silviculture practices applied to forest stands, followed by a sequence of field trips, case studies and discussions introducing concepts and applications of multiple use in forestry. Consideration of the effects of ownership, forest conditions, economic factors and achieving management objectives. (Summer Session Staff)

502. RESOURCES MANAGEMENT

*3 credit hours*

The interrelationships between man and forest resources and the multiple services which those resources provide; the extent and nature of responsibilities of the forester to the community and to society in his stewardship of natural resources. Spring. Staff.

541. SOIL AND WATER CONSERVATION

*3 credit hours*

Lectures and discussion of principles and methods of soil and water conservation. Spring. Mr. Black.

*Note:* Will be offered Fall and Spring in 1971–72.

798. RESEARCH PROBLEMS IN RESOURCES MANAGEMENT

*Credit hours arranged according to nature of problem*

Special investigation and analysis of resource management problems where integrative relationships of several subject aspects of forestry are a major consideration. Fall & Spring. Staff.

## SILVICULTURE

302. SILVICS (SUMMER FIELD SESSION)

*1 credit hour*

Dynamics of forest development; the species and their several characteristics—including tolerance, growth, survival, and patterns of reproduction; species interrelationships; successional trends—effects on forest stand structure. Observation of forest responses following natural catastrophe, logging, clearing, or fire. Introduction to principles of forest cover manipulation by man. Staff.

324. GENERAL SILVICULTURE

*3 credit hours*

Three hours of lecture per week for first half of semester; two hours of lecture and three hours of lab or field work per week during second half of semester. Presentation of silvicultural concepts, principles, and practices. Not designed for biology or resource management majors. Spring. Staff.

*Prerequisite:* Junior standing.

332. SOILS

*3 credit hours*

Two hours of lecture and three hours of laboratory. Introduction to the fundamentals of soil science with particular reference to forestry, but including other land uses. Fall. Mr. Craul.

351. METEOROLOGY AND FIRE BEHAVIOR

*3 credit hours*

Lectures and recitations in atmospheric physics and the physics and chemistry of combustion lead to discussions of fire behavior and the strategy and tactics of fire suppression. Fall. Mr. Herrington.

*Prerequisite:* Physics 103 & 104 (Calculus helpful but not required).

497. SILVICULTURE SEMINAR

*2 or 3 credit hours*

Group study of selected silvicultural problems or situations of mutual interest. Emphasis is on critical evaluation and analysis and on organization and presentation of results from individual study for group consideration. Spring. Staff.

### 498. SPECIAL STUDIES IN SILVICULTURE

*1 to 3 credit hours*

Independent research in silviculture for selected undergraduate students. Selection of subject areas determined by the student in conference with appropriate faculty member. Final written report is required for departmental record. Fall or Spring. Staff.

*Prerequisites:* Consent of instructor and department chairman.

### 520. APPLICATIONS OF ECOLOGY

*3 credit hours*

Three hours of lecture or discussion per week, or two hours of lecture and a three hour field trip per week. Examination of ecological concepts relevant to practices modifying terrestrial ecosystems for human benefit: seminar by specialists in selected fields of applied ecology, and student presentations-discussion-ecological implications of specific environmental design problems. Course designed primarily for advanced L A students but open to others. Fall or Spring. Mr. Richards.

*Prerequisites:* F Biol 320 or permission of instructor.

### 521. PRINCIPLES OF SILVICULTURE

*3 credit hours*

Three hours of lecture during the first half of the semester; two hours of lecture and three hours of lab during the second half of the semester. The forest as a community. Site factors and forest stand dynamics. Introduction to manipulation of forest cover to meet objectives of forest owners. Spring. Mr. Berglund.

*Prerequisites:* Summer Session in Field Forestry, F Bot 330 or F Bot 530 concurrently, or permission of instructor.

### 524. PRACTICES OF SILVICULTURE

*3 credit hours*

Two hours of lecture and one three-hour lab or field trip. Theory and practices of silvicultural manipulation of forest stands to gain objectives of the forest owner. Emphasis is on thinning, reproduction cuttings, planting, and other silvicultural operations in their relationships to economic and ecological factors. Fall. Mr. Johnson.

*Prerequisite:* Silvi 521 or permission of the instructor.

### 525. ADVANCED PRACTICES OF SILVICULTURE

*3 credit hours*

Four hours of lecture and seminar during the first half of the semester; six hours of field exercises thereafter. Development of silvicultural decisions in management of woodlands. Trips to forest areas. A cultural plan prepared to attain assigned objectives. Spring. Mr. Lea.

*Prerequisite:* Silvi 524.

### 528. REGIONAL STUDIES

*2 credit hours*

Two hours of lecture. Study and analysis of the many factors that influence the silvicultural management of the important tree species of North America. These factors include importance of forest and forestry to a designated region, physiography, geology, soils, climate and weather, sites and site types, ecology, problems of protection and silvical characteristics of the more important species. Spring. Staff.

*Prerequisite:* Silvi 524.

### 535. FOREST SOILS

*3 credit hours*

One hour of lecture, one hour of discussion, four hours of lab, field study of forest soils. Effect of silvicultural operations on soil. Selection of tree species for planting on different soils. Tree growth and development—soil properties relationships. Methods of soil sampling and laboratory analysis. Fall. Mr. Leaf.

*Prerequisites:* Silvi 332.

### 540. FOREST HYDROLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. The relation of forest and range vegetation to its environment, and its effect upon soil and water. Measurement of precipitation, runoff, erosion and other variables. Fall & Spring. Mr. Eschner & Mr. Black.

### 542. PRACTICE OF WATERSHED MANAGEMENT

*3 credit hours*

Two hours of lecture, three hours of lab. The impact of the multiple use of forest and range lands on water yield and soil stability. Regional problems and potential solutions. Spring. Mr. Eschner.

*Prerequisite:* Silvi 540.

### 552. PHYSICAL CLIMATOLOGY

*3 credit hours*

Three hours of lecture. Examination of the physical processes of the atmosphere as they relate to the exchange of heat, moisture, and momentum in the earth-atmosphere system. Emphasis on the meteorological and micrometeorological basis of climate and its interaction with the biological world. Spring. Mr. Herrington.

*Prerequisite:* Junior standing or permission of instructor.

### 553. METEOROLOGY LABORATORY

*1 credit hour*

Three hours laboratory. An extension of Silvi 552 which provides analysis and discussion of the atmospheric processes important to weather and climate. Major topics include air mass analysis, surface weather map analysis, and climatological summarization procedures. Spring. Mr. Herrington.

*Prerequisites:* Silvi 552 or concurrently and permission of instructor.

### 577. FOREST TREE IMPROVEMENT

*3 credit hours*

Two hours of lecture, three hours of lab or field work. General principles and methods of tree improvement practiced in this country and abroad. Tree selection, techniques of vegetative propagation, hybridization, polyploidy, establishment of seed orchards, clonal and offspring testing and other problems. Spring. Mr. Gladstone.

*Prerequisite:* F Biol 571 & 572 strongly advised.

### 625. PRODUCTIVITY OF FOREST STANDS

*3 credit hours*

Examination of forest tree and stand production variables as related to silvicultural manipulation. Analysis of stand response, such as rate of growth, stem form, product quality, tree value and value. Preparation of stand treatment schedules. Spring. Staff.

*Prerequisite:* Permission of instructor.

### 640. ADVANCED WILDLAND HYDROLOGY

*3 credit hours*

Lecture, discussion and laboratory sessions in advanced problems of forest and range hydrology, watershed management methods and techniques, and evaluation of new methods of hydrologic data collection and analysis. Fall. Mr. Black.

*Prerequisites:* Silvi 540 or F Engr 340.

### 641. WATERSHED ANALYSIS

*3 credit hours*

One hour of lecture and six hours of laboratory each week. Lecture and field experience in watershed characterization, inventory, and analysis in terms of land management problems. Fall. Mr. Black.

*Prerequisites:* Silvi 540 and permission of instructor.

### 642. SNOW HYDROLOGY

*3 credit hours*

Three one-hour lectures per week and two three-day field trips. Physical characteristics of snow and the energy relations important in its accumulation and dissipation. Problems of measurement and prediction of runoff and melt. Potentials for management. Spring. Mr. Eschner.

*Prerequisites:* Silvi 540 or F Engr 340.

### 677. ADVANCED FOREST TREE IMPROVEMENT

*3 credit hours*

Two hours lecture and discussion, three hours lab. A study of advanced principles and techniques for genetic improvement of forest trees. Special emphasis is placed on selection and breeding for growth rates, wood quality, and insect and disease resistance. Problems of tree hybridization, racial variation, sexual reproduction, and quantitative genetics in forest trees. Laboratory training in cytology and cytogenetics, pollen germination, vegetative propagation and other problems. Independent research problems will be undertaken by the student. Fall or Spring. Mr. Gladstone.

*Prerequisites:* F Biol 571 & 572, Silvi 577.

### 730. RESEARCH METHODS IN SILVICULTURE

*3 credit hours*

Three hours of lecture or discussion. Research concepts and methodology with particular application to silviculture and its related sciences. More appropriate to beginning students or before taking thesis work. Fall. Staff.

*Prerequisite:* Permission of instructor.

### 735. FOREST SOIL FERTILITY (APPLIED STUDIES)

*2 to 4 credit hours*

Two hours of lecture, one hour of discussion. None to six hours of lab depending on number of credit hours. Influence of soil fertility on development and growth of seedlings and trees, and techniques involved to determine this influence. Chemical and biological analysis to determine levels of soil fertility. Nutrient element deficiencies and their correction by soil amendments and fertilizers. Term projects by the student will be undertaken. Spring. Mr. Leaf.

*Prerequisites:* Chem 332 & 333, F Bot 530, Silvi 535, or equivalent.

### 737. FOREST SOIL PHYSICS

*4 credit hours*

Three hours of lecture and discussion and three hours of laboratory. Presentation of principles of soil physics including water flow, storage and availability, soil permeability, heat transfer, and their consideration as root environmental factors. Analytical procedures are introduced and evaluated. Applications of soil physics to silvics, soil fertility, watershed management and hydrology, soil biology and land-use. Spring. Mr. Craul.

*Prerequisites:* Silvi 332, 535, or their equivalents. Physical chemistry and integral calculus strongly recommended.

### 750. MICROMETEOROLOGY

*3 credit hours*

Two hours lecture and three hours of lab. A comprehensive study of the physical processes taking place in the lowest layer of the atmosphere. Primary emphasis on the turbulent transfer of heat, momentum, and water vapor and the expression of these fluxes in the microclimate. Spring. Mr. Herrington.

*Prerequisites:* Silvi 552, Physics and Calculus.

### 777. QUANTITATIVE GENETICS IN FOREST TREE IMPROVEMENT

*3 credit hours*

Two-hour lecture and discussion, three hours lab. Development of statistical models for determining heritability in forest trees. Breeding models and computer analysis application in forest genetics. Fall or Spring. Mr. Gladstone.

### 797. GRADUATE SILVICULTURE SEMINAR

*1 credit hour*

Three hour class discussion per week. Assigned reports and discussion of silvicultural topics. Fall & Spring. Staff.

### 798. RESEARCH PROBLEMS IN SILVICULTURE

*Credit hours arranged according to nature of problem*

Hours to be arranged. Fall & Spring. Staff.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall and Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall and Spring. Staff.

## WOOD PRODUCTS ENGINEERING

### 304. INTRODUCTION TO FOREST PRODUCTS

*2 credit hours*

Two hours of lecture. Characteristics of the products of the forest tree and manufacture of wood products. Fall. Mr. E. Anderson.

### 322. MECHANICAL PROCESSING

*3 credit hours*

Two hours of lecture, three hours of lab. Primary log reduction methods and industry practices. Lumber grading. Wood cutting principles. Machining practice in secondary wood-using industries. Experience in the operation of certain primary and secondary machining equipment. Fall. Mr. Moore.

### 390. FIELD TRIP

*2 credit hours*

Two weeks supervised study and reporting of representative wood products industries. Spring. Staff. Required of all students in WPE. Estimated individual expenses are $100–150 while on the trip.

### 402. ELEMENTARY TIMBER MECHANICS

*3 credit hours*

Two hours of lecture, three hours of lab. Introduction to strength properties of wood, and wood products and other construction materials. Applications of these materials in typical construction problems. Fall. Mr. Kyanka.

*Prerequisites:* Senior standing or permission of instructor.

### 442. LIGHT CONSTRUCTION

*3 credit hours*

Two hours of lecture, three hours of lab. Elements of light frame construction, blueprint reading, and estimating. Fall. Mr. G. Smith.

### 486. ELEMENTARY WOOD TECHNOLOGY

*2 credit hours*

One hour of lecture, three hours of lab. Structure of wood in relation to defects, properties and uses. The variability of wood. Identification of major commercial U.S. timber by gross feature. Spring. Mr. deZeeuw & Staff.

### 487. WOOD STRUCTURE AND PROPERTIES

*4 credit hours*

Two hours of lecture, six hours of lab. Identification variability and anatomical characteristics of wood and paper-making fibers. Uses, properties and sources of wood and fibers. Structure of wood in relation to defects, properties, and uses. Fall. Mr. de Zeeuw & Staff.

*Prerequisite:* F Bot 100 or consent of instructor. Fall.

### 497. SENIOR SEMINAR FOR WOOD PRODUCTS ENGINEERING MAJORS

*2 credit hours*

Discussion and assigned reports in current problems and new developments in wood products engineering. Fall. Mr. Anderson & Staff.

### 498. RESEARCH OR DESIGN PROBLEM

*1–3 credit hours*

Conferences, library, laboratory and/or field research on a specific problem in wood products engineering. Typewritten report (original and one copy) required. Fall and/or Spring. Staff.

*Prerequisite:* Consent of instructor.

### 502. TIMBER MECHANICS

*4 credit hours*

Three hours of lecture and three hours of lab second semester. Mechanical properties of wood and elements of structures. Lectures, problems, and use of timber-testing equipment. Spring. Mr. Kyanka.

*Prerequisites:* Calculus, Physics.

### 504. DESIGN OF WOOD STRUCTURAL ELEMENTS

*3 credit hours*

Lectures plus lab exercises. A development of the principles involved in designing structural elements in wood and practice in their application. Fall. Mr. Kyanka.

*Prerequisite:* WPE 502.

### 520. POLYMERIC ADHESIVES & COATINGS

*3 credit hours*

Two hours of lecture, three hours of lab. Physical and chemical properties of organic adhesives and surface coatings. Evaluation of application methods and performance on substrates. Spring. Mr. L. Smith.

*Prerequisite:* Junior standing.

### 522. COMPOSITE MATERIALS

*3 credit hours*

Two hours of lecture, three hours of lab. Manufacturing methods and physical properties of wood laminates, fiberboard, particleboard, plywood, paper overlays, sandwich materials, wood-polymer composites, and extruded and molded products. Fall. Mr. Moore.

*Prerequisites:* WPE 520, & WPE 526. Concurrent or prior registration in WPE 502 or 402.

### 526. FLUID TREATMENTS

*2–3 credit hours*

Two hours of lecture (2 credit hours), three hours of lab (1 credit hour). Steady-state and unsteady-state flow of liquids, gases, water vapor, and heat as related to wood structure. Wood preservative and fire-retardant treatments. Laboratory studies in permeability measurement, impregnation of wood with liquids, dry kiln operation, and wood preservation. Spring. Mr. Siau.

*Prerequisites:* WPE 487 and WPE 322 (WPE 322 waived when only lecture is taken).

### 544. MATERIALS MARKETING

*3 credit hours*

Three hours of lecture and discussion. Marketing functions, agencies, and management in the wood products and related industries. Principles of salesmanship and their application. Spring. Mr. G. Smith.

### 550. CONSTRUCTION EQUIPMENT

*3 credit hours*

Three hours lecture. Principles of selection, operation and maintenance of construction equipment. Primary types of site preparation, handling and assembly devices and their efficient utilization will be examined. Spring. Mr. Kyanka.

*Prerequisite:* Senior Standing.

### 554. CONSTRUCTION MANAGEMENT

*3 credit hours*

Two hours lecture, three hours of laboratory. Conception, management, and control of the construction process with emphasis on specifications, costs, legal boundaries, erection planning and control, inspection and supervision. Spring. Mr. Whitt.

*Prerequisite:* Senior Standing.

### 566. WOOD-WATER RELATIONSHIPS

*3 credit hours*

Two hours of lecture, three hours of lab. Consideration of basic wood-water relationships and the drying of lumber and other wood products. Fall. Mr. Skaar.

*Prerequisites:* Physics, calculus, WPE 526 or equivalent.

### 570. PRODUCTION SYSTEMS I: ANALYSIS

*3 credit hours*

Two hours of lecture, three hours of lab. Elements of system engineering. Analysis of performance characteristics of integrated production systems. Analysis of long-range vs. short-range system planning. A comprehensive lab problem is commenced which deals with the analysis prerequisite to the establishment of a manufacturing plant in a wood-processing industry. Fall. Mr. Whitt.

*Prerequisites:* Senior status and IE 548, AM 591, and concurrent registration in IE 575 or equivalent.

### 572. PRODUCTION SYSTEMS II: SYNTHESIS

*3 credit hours*

Two hours of lecture and three hours of lab. Organization for production. Manufacturing engineering and production planning and control. Plant layout and materials handling. A comprehensive problem of a production system synthesis is carried out in a succession of lab exercises oriented toward a wood-processing industry. Spring. Mr. Whitt.

*Prerequisite:* WPE 570 or equivalent.

### 585. MICROTECHNIQUE AND PHOTOMICROGRAPHY

*3 credit hours*

One lecture and demonstration lab, one lab. Preparation of plant and animal tissue for sectioning. Techniques of embedding, sectioning, staining and mounting. Photography through the microscope. Film and print processing. Theory of the light microscope and brief introduction to electron microscopy. Fall. Mr. Côté.

*Prerequisites:* WPE 486 or WPE 487, & organic chemistry.

### 588. COMMERCIAL TIMBERS OF THE WORLD

*3 credit hours*

One hour of lecture, one hour of conference, three hours of lab, and assigned reading. Important commercial timbers of the world, their structure, physical properties, deZeeuw.
identification, supply and uses. Spring. Mr.

*Prerequisite:* WPE 487.

### 596. SPECIAL TOPICS

*1 to 3 credit hours*

Lectures, conferences, discussions, recitations, problems, and laboratory. Special topics in wood products engineering: continuations, expansions, studies in depth, and new contemporary subject areas of concern to science or practice of wood products engineering. Fall and/or Spring. Staff.

*Prerequisite:* Consent of instructor.

### 702. ELASTICITY OF WOOD AND PLYWOOD

*3 credit hours*

Theory of elasticity as applied to solid and laminated wood, sandwich material, and plywood. Elements of wood plasticity. Spring. Mr. Davidson.

*Prerequisites:* WPE 502, Physics 203, & Physics 204.

### 796. ADVANCED TOPICS

*2 or 3 credit hours*

Lectures, conferences, discussions, and lab. Advanced topics in wood products engineering, including advanced studies in one or more of the basic areas covered in other courses in wood products engineering. Fall or Spring. Staff.

*Prerequisite:* Consent of instructor.

### 797. WOOD PRODUCTS ENGINEERING SEMINAR

*2 or 3 credit hours*

Conference, discussion and reports analyzing current research and new developments, new literature and subject matter surveys in wood products engineering. Fall & Spring. Mr. Anderson & Staff.

### 798. RESEARCH IN WOOD PRODUCTS ENGINEERING

*Credit hours arranged according to nature of problem*

Investigations on directed study in wood products engineering including manufacturing, marketing, anatomy, physics, quality and mechanical properties of wood. One typewritten report (original and one carbon) required. Fall & Spring. Staff.

### 860. ADVANCED WOOD PHYSICS

*3 credit hours*

Three hours of lecture. The physics of wood and wood-base materials. Treatment of wood-moisture relations with emphasis on movement of liquids and heat through wood. Derivation of the diffusion equations and their application to wood-treating and wood-drying processes. Spring. Mr. Skaar.

*Prerequisites:* WPE 566, Math 585.

### 880. INTERPRETATION OF CELLULAR ULTRASTRUCTURE

*2 credit hours*

One hour of lecture, two hours of demonstration and discussion. The organization and sculpturing of the walls of plant cells; the cellulose microfibril, matrix and incrusting substances, and the warty layer. The ultrastructure and general function of cytoplasmic organelles in cells. The tools and techniques used for light and electron microscopic study of cells, and the interpretation of structural evidence. Directed study and discussion of the latest (current) literature on pertinent topics. Spring. Mr. Côté.

*Prerequisite:* Permission of the instructor.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

## FOREST ZOOLOGY*

### 100. GENERAL ZOOLOGY

*4 credit hours*

Prerequisite to all other courses in Forest Zoology. An auto-tutorial course with two hours of lecture and recitation, four hours in the learning center. A brief survey of major phyla with emphasis on morphology, taxonomy, evolution, and ecology followed by an introduction to the processes of maintenance, perpetuation, and adaptation by animal species. The importance of other animals to man and the ecosystem is emphasized. Spring. Mr. Van Druff.

### 200. WILDLIFE CONSERVATION

*3 credit hours*

Two hours of lecture, one hour of recitation. Introduction to the biological principles of conservation including the relationship of natural resources to modern society. The wildlife resource and its conservation will be emphasized. It is not designed for students concentrating in the area of Forest Wildlife Management. Fall. Mr. Payne.

*Prerequisite:* One semester of biological science.

### 511. INVERTEBRATE ZOOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Structure, classification and evolution of invertebrates. Emphasis on role of specific invertebrates in their natural habitat. Spring. Mr. Dindal.

### 512. VERTEBRATE TAXONOMY

*3 credit hours*

Two hours of lecture, three hours of lab. Identification and classification of vertebrates of central New York. Included are the principles of taxonomy, evolution and distribution, collection procedures, and the use of field keys. Spring. M. Alexander.

### 516. ICHTHYOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. An introduction to the anatomy, physiology, ecology, behavior and taxonomy of fishes. Spring. Mr. Werner.

### 520. TERRESTRIAL COMMUNITY ECOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. Relations of terrestrial animals to their physical, chemical and biological environment. Emphasis on community principles, succession and terrestrial adaptations. Fall. Mr. Dindal.

*Prerequisites:* A course in basic ecology.

### 523. INVERTEBRATE ECOLOGY

*2 credit hours*

Note: SUNY, Albany No. BIO 423

Two full days/week for four weeks. Study of terrestrial invertebrate micro-communities; descriptive and comparative assay of microhabitats incorporating experimental and field techniques. Summer Session I, Cranberry Lake Biological Station. Mr. Dindal, College of Forestry.

*Prerequisites:* General biology, general ecology; invertebrate zoology is recommended.

### 524. VERTEBRATE ECOLOGY

*2 credit hours*

Note: SUNY, Albany No. BIO 425

Two full days/week for four weeks. Utilization of unique Adirondack forms and communities to study population dynamics, behavior, systematics and ecological role of vertebrates; standard field and laboratory techniques. Summer Session II, Cranberry Lake Biological Station. Mr. Rosenzweig, SUNYA.

*Prerequisites:* 12 hours of biology.

### 525. LIMNOLOGY

*3 credit hours*

Two hours of lecture, and either three hours of laboratory or one hour of discussion per week. An introduction to the ecology of inland waters. Particular emphasis is placed on the aquatic environment as a habitat and the effect of changes in this environment on the structure and function of the biological communities contained therein. Fall. Mr. Werner.

### 528. VERTEBRATE POPULATION ECOLOGY

*3 credit hours*

Two hours of lecture and one three-hour lab per week. Fundamental parameters of population structure and change with emphasis on vertebrate species. Fall or Spring. Mr. Van Druff.

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*See also listings for Forest Biology.

*Prerequisite:* A course in general ecology.

### 530. ANIMAL PHYSIOLOGY

*3 credit hours*

Three hours lecture. Principles of digestion, circulation, respiration, excretion, physiologic defense mechanisms, muscle contraction, electrophysiology, neural and endocrinologic regulation, and reproduction. Spring. Mr. Hartenstein.

### 540. FISHERY BIOLOGY

*2 credit hours*

One hour of lecture, three hours of lab. Principles and techniques of handling fisheries resources in fresh-water environments. Spring. Mr. Werner.

*Prerequisite:* F. Zool 525 and F. Zool 516, or permission of instructor.

### 552. WILDLIFE ECOLOGY

*3 credit hours*

Two hours of lecture, three hours of lab. A study of the principles governing forest and range wildlife and of the biological mechanisms involved. Spring. Mr. Chambers.

*Prerequisite:* F. Biol. 320, or permission of instructor.

### 555. WILDLIFE METHODS

*3 credit hours*

Two hour lecture, three hour lab. Field and laboratory techniques, with emphasis on demonstration and experience. One weekend and Saturday field trips are scheduled. Fall. Mr. Chambers.

*Prerequisite:* F. Zool 552.

### 570. PRINCIPLES OF ANIMAL BEHAVIOR

*3 credit hours*

Three hours of lecture per week. A study of the basic principles of animal behavior, stressing exogenous and endogenous mechanisms of control. Fall. Mr. Price.

*Prerequisite:* General Zoology.

### 575. BEHAVIORAL ECOLOGY

*2 credit hours*

Cranberry Lake Biological Station. Session I. Half time for four weeks. Study of the behavioral adaptations of animals to their environment. Emphasis will be placed on animal orientation and social behavior. Habitat selection and interspecific interactions will also be considered. Mr. Price, College of Forestry.

*Prerequisite:* General biology and general ecology.

*Note:* Credit may not be received for both Forest Zoology 575 and Forest Zoology 570.

### 580. COMPARATIVE HISTOLOGY

*3 credit hours*

Two hours lecture, three hours lab. An integrated and comparative survey of structure and function of tissues throughout the animal kingdom. Fall. Mr. Hartenstein.

*Prerequisite:* F. Zool 100 or equivalent.

### 585. VERTEBRATE ANATOMY

*4 credit hours*

Three hours of lecture and recitation, three hours of lab. Comparative study of the anatomy of representative vertebrates, emphasizing structural, functional and developmental characteristics. Fall. Mr. Graves.

### 620. INVERTEBRATE SYMBIOSIS

*3 credit hours*

Two hours of lecture and one three-hour lab. An introduction to the ecology and evolution of interspecific relationships of invertebrates. Spring, even years. Mr. Dindal.

*Prerequisites:* F Bio 320, F Zool 511.

### 630. COMPARATIVE ENDOCRINOLOGY

*3 credit hours*

Three hours lecture. General endocrinology with emphasis on the comparative functions of endocrine glands of animals. Spring. Mr. Graves.

*Prerequisite:* F. Zool 530 or equivalent.

### 670. VERTEBRATE BEHAVIOR

*3 credit hours*

Two hours lecture, three hours lab. In depth study of the major concepts of animal behavior associated with behavioral genetics, development, orientation and social behavior. Spring. Mr. Price.

*Prerequisite:* F. Zool 570.

### 700. FOREST ZOOLOGY TRIP

*2 credit hours*

A 7 to 10 day trip to (1) agencies engaged in zoological research, management, and administration, or (2) regions or areas of unusual biological interest. A final report is required. Estimated student expense, $75.00. Fall or Spring. Staff.

### 720. TOPICS IN SOIL INVERTEBRATE ECOLOGY

*3 credit hours*

Two one-hour lecture-discussion periods and a three-hour lab. Study of literature relating to soil invertebrate microcommunities; taxonomy, culturing and collection methods of soil fauna; student will conduct an individual research problem. Spring, odd years. Mr. Dindal.

*Prerequisite:* Permission of instructor.

### 725. ZOOGEOGRAPHY

*3 credit hours*

Two hours of lecture, three hours of lab. Geographic distribution of vertebrate animals, factors determining their distribution, and nature of range occupied. Fall. Mr. Webb.

### 750. ADVANCED WILDLIFE MANAGEMENT

*3 credit hours*

Two hours lecture, three hours lab. Advanced wildlife management with emphasis on regional and administrative wildlife problems. Extended trips (two weekend trips) are required. Fall. Mr. Chambers.

*Prerequisite:* F Zool 550 or permission of the instructor.

### 797. FOREST ZOOLOGY SEMINAR

*1 credit hour*

Two hours of discussion and assigned reports on current problems and new developments in forest zoology. Fall and/or Spring. Staff.

### 798. PROBLEMS IN FOREST ZOOLOGY

*Credit hours to be arranged*

Hours to be arranged. Individual study of special problems in forest zoology. One typewritten report (original and one carbon) required. Fall and/or Spring. Staff.

### 830. PHYSIOLOGICAL ECOLOGY

*3 credit hours*

Two hours lecture, one hour discussion. An examination of the concepts of animal adaptation to ecological change from a physiological point of view. Particular emphasis will be placed on physiological responses of the vertebrate digestive, excretory, endocrine, nervous and reproductive systems to modifications of the environment. Fall—odd numbered years. Mr. Graves.

*Prerequisite:* F. Zool 630.

### 835. INVERTEBRATE PHYSIOLOGY

*3 credit hours*

Two hours lecture, three hours lab. A study of the physiologic mechanisms employed by invertebrates other than insects in coping with the exigencies of their environment. Fall or Spring. Alternate years. Mr. Hartenstein.

*Prerequisites:* F. Zool 511 and F. Zool 530.

### 899. MASTER'S THESIS

*Credit hours to be arranged*

Research and independent study for the Master's degree and thesis. Fall & Spring. Staff.

### 950. TOPICS IN WILDLIFE BIOLOGY

*1 to 3 credit hours*

Hours to be arranged. Group study of a wildlife management topic. Fall or Spring. Mr. Chambers.

*Prerequisites:* Six credits of wildlife management courses.

### 970. TOPICS IN ANIMAL BEHAVIOR

*2 credit hours*

Two hours lecture and discussion. A seminar-type course designed to explore in depth selected and controversial subject areas in animal behavior. Fall or Spring. Mr. Price.

*Prerequisite:* F. Zool 670 or equivalent.

### 999. DOCTORAL THESIS

*Credit hours to be arranged*

Research and independent study for the doctoral degree and dissertation. Fall & Spring. Staff.

# X

# THE COLLEGE FACULTY AND PROFESSIONAL STAFF

The date in parentheses after each name denotes the first year of service, two or more dates, the term of service. An asterisk (*) indicates graduate faculty.

Roger F. Adams (1969)
*Research Associate*
*Department of Forest Chemistry*
B.Sc., Sheffield University, 1965; Ph.D., 1968

Maurice M. Alexander (1949)*
*Professor and Chairman*
*Department of Forest Zoology*
B.S., State University of New York College of Forestry, 1940; M.S., University of Connecticut, 1942; Ph.D., State University of New York College of Forestry, 1950

Douglas C. Allen (1968)*
*Assistant Professor*
*Department of Forest Entomology*
B.S., University of Maine, 1962; M.S., 1965; Ph.D., University of Michigan, 1968

David G. Anderson (1959)*
*Vice President for Administration*
*Associate Professor*
State University of New York College of Forestry (Ranger School), 1950; B.S., State University of New York College of Forestry, 1953; M.S., University of Utah, 1958

Eric A. Anderson (1950)*
*Professor*
*Department of Wood Products Engineering*
B.S.F., University of Washington, 1932; Ph.D., State University of New York College of Forestry, 1949

George R. Armstrong (1950)*
*Professor*
*Department of Forestry Economics*
B.S., State University of New York College of Forestry, 1949; M.S., 1959; Ph.D., 1965

Alan L. August (1969)
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*School of Landscape Architecture*
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*Department of Forestry Economics*
B.A., Yale University, 1930; M.B.A., Harvard University, 1932

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*Dean of Public Service, Continuing Education and Educational Communications*
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Robert A. Zabel (1947)*
*Vice President for Academic Affairs*
*Professor, Department of Forest Botany and Pathology*
B.S., University of Minnesota, 1938; M.S., State University of New York College of Forestry, 1941; Ph.D., 1948

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George J. Albrecht (1946–1968)
*Professor Emeritus*
*Director Emeritus, School of Landscape Architecture*
B.S., State University of New York College of Forestry, 1930

Lawrence J. Belanger (1947–1965)
*Registrar Emeritus*
*Professor Emeritus*
B.S., Syracuse University, 1932; M.S., New York State College for Teachers, Albany, 1941

Harold C. Belyea (1917–1956)
*Professor Emeritus*
B.A., University of Mount Allison, 1908; M.A., 1911; B.Sc.F., University of New Brunswick, 1911; M.F., Yale University, 1916

Floyd E. Carlson (1930–1969)
*Professor Emeritus*
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Raymond F. Crossman (1942–1968)
*Dean of Students Emeritus*
*Professor Emeritus*
B.A., Syracuse University, 1926; M.A., 1931

James E. Davis (1947–1965)
*Professor Emeritus*
B.S., Cornell University, 1924; M.F., 1926

Carlyn C. Delavan (1923–1957)
*Professor Emeritus*
A.B., University of Michigan, 1914; M.F.S., 1915

Wilford A. Dence (1920–1961)
*Professor Emeritus*
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*Director Emeritus, Ranger School*
*Professor Emeritus*
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William M. Harlow (1928–1965)
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B.S., Hamline University, 1917; M.S., State University of New York College of Forestry, 1924; Ph.D., 1928

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**Hardy L. Shirley** (1945–1967)
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*Professor Emeritus*
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B.S., Michigan State College, 1928; M.S., University of Michigan, 1929

**Ralph G. Unger** (1937–1964)
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B.S., State University of New York College of Forestry, 1930

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A.B., Syracuse University, 1946

**Harold G. Wilm** (1953–1966)
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*Associate Dean Emeritus*
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**Louis E. Wise** (1919–1932)
*Professor Emeritus*
B.A., Columbia University, 1907; Ph.D., 1911

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## STATE UNIVERSITY OF NEW YORK

Office of the Chancellor, 8 Thurlow Terrace, Albany, N.Y. 12201

### UNIVERSITY CENTERS

1 State University at Albany
2 State University at Binghamton
3 State University at Buffalo
4 State University at Stony Brook

### MEDICAL CENTERS

5 Downstate Medical Center at Brooklyn
6 Upstate Medical Center at Syracuse

### COLLEGES OF ARTS AND SCIENCE

7 College at Brockport
8 College at Buffalo
9 College at Cortland
10 College at Fredonia
11 College at Geneseo
12 College at New Paltz
13 College at Old Westbury
14 College at Oneonta
15 College at Oswego
16 College at Plattsburgh
17 College at Potsdam
18 College at Purchase
19 *Upper Division College

*(During planning and construction of its permanent campus, the Upper Division College offers evening, Saturday and summer courses at a temporary location, 811 Court Street, Utica.)

### SPECIALIZED COLLEGES

20 College of Forestry at Syracuse University
21 Maritime College at Fort Schuyler (Bronx)
College of Optometry at New York City

### NON-RESIDENTIAL COLLEGE

Empire State College at Saratoga Springs

### AGRICULTURAL AND TECHNICAL COLLEGES (Two-Year)

Alfred
Canton
Cobleskill
Delhi
Farmingdale
Morrisville

### STATUTORY COLLEGES

College of Ceramics at Alfred University
College of Agriculture and Life Sciences at Cornell University
College of Human Ecology at Cornell University
School of Industrial and Labor Relations at Cornell University
Veterinary College at Cornell University

### COMMUNITY COLLEGES

(Locally-sponsored, two-year colleges under the program of State University)

Adirondack Community College at Glens Falls
Auburn Community College at Auburn
Borough of Manhattan Community College
Bronx Community College
Broome Community College at Binghamton
Clinton Community College at Plattsburgh
Columbia-Greene Community College at Athens
Community College of the Finger Lakes at Canandaigua
Corning Community College at Corning
Dutchess Community College at Poughkeepsie
Erie Community College at Buffalo
Fashion Institute of Technology at New York City
Fulton-Montgomery Community College at Johnstown
Genesee Community College at Batavia
Herkimer County Community College at Ilion
Hostos Community College at South Bronx
Hudson Valley Community College at Troy
Jamestown Community College at Jamestown
Jefferson Community College at Watertown
Kingsborough Community College
LaGuardia Community College at Long Island City
Mohawk Valley Community College at Utica
Monroe Community College at Rochester
Nassau Community College at Garden City
New York City Community College
Niagara County Community College at Niagara Falls
North Country Community College at Saranac Lake
Onondaga Community College at Syracuse
Orange County Community College at Middletown
Queensborough Community College
Rockland Community College at Suffern
Schenectady County Community College at Schenectady
Staten Island Community College
Suffolk County Community College at Selden
Sullivan County Community College at South Fallsburg
Tompkins-Cortland Community College at Groton
Ulster County Community College at Stone Ridge
Westchester Community College at Valhalla

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STATE UNIVERSITY OF NEW YORK and the College of Forestry are accredited by the Middle States Association of Colleges and Secondary Schools. The College of Forestry also is accredited by the Society of American Foresters. The School of Landscape Architecture is accredited by the American Society of Landscape Architects.

STATE UNIVERSITY OF NEW YORK
LET EACH BECOME ALL HE IS CAPABLE OF BEING
1948